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# Platform Conveyors in a Railway Repair Shop

CONVEYORS of any type are seldom used in repair work. This makes their use of unusual interest in the railway repairs carried on progressively, utilizing platform conveyors, by the London Underground Electric Railways at their new shops in Acton, in the western part of London.

With a total rolling stock of approximately 2,100 cars, the present schedule calls for overhauling two-thirds of them each year, which is an average of 18 months for all the cars, or about 60,000 miles per car between overhauls. Trailers average approximately 75,000 miles between shoppings. The shops, however, have a capacity of 40 cars per week with a working force of 845 men and 35 women.

The area occupied by the main building, which includes the track and the body and paint shops measures 400x375 ft. The cars to be overhauled enter what is known as the lifting shop, where the bodies are raised from the trucks by the 30-ton duplex crane shown in Fig. 1. The crane has a span of 65 feet.

Each end of a car is handled by a sling, operated by independent hoists which can be worked together by a single control handle, or independently as desired. When used together, they lift at a uniform speed regardless of the weight of each end of the car. After the body has been raised, the trucks are run out and the body is placed on the special trucks shown in the foreground, which hold it at a convenient height to enable men to work easily under it.

The truck shop is divided into six sections in which are handled armatures, motor cases, brake gear truck frames, journal boxes, wheels and axles, respectively. The

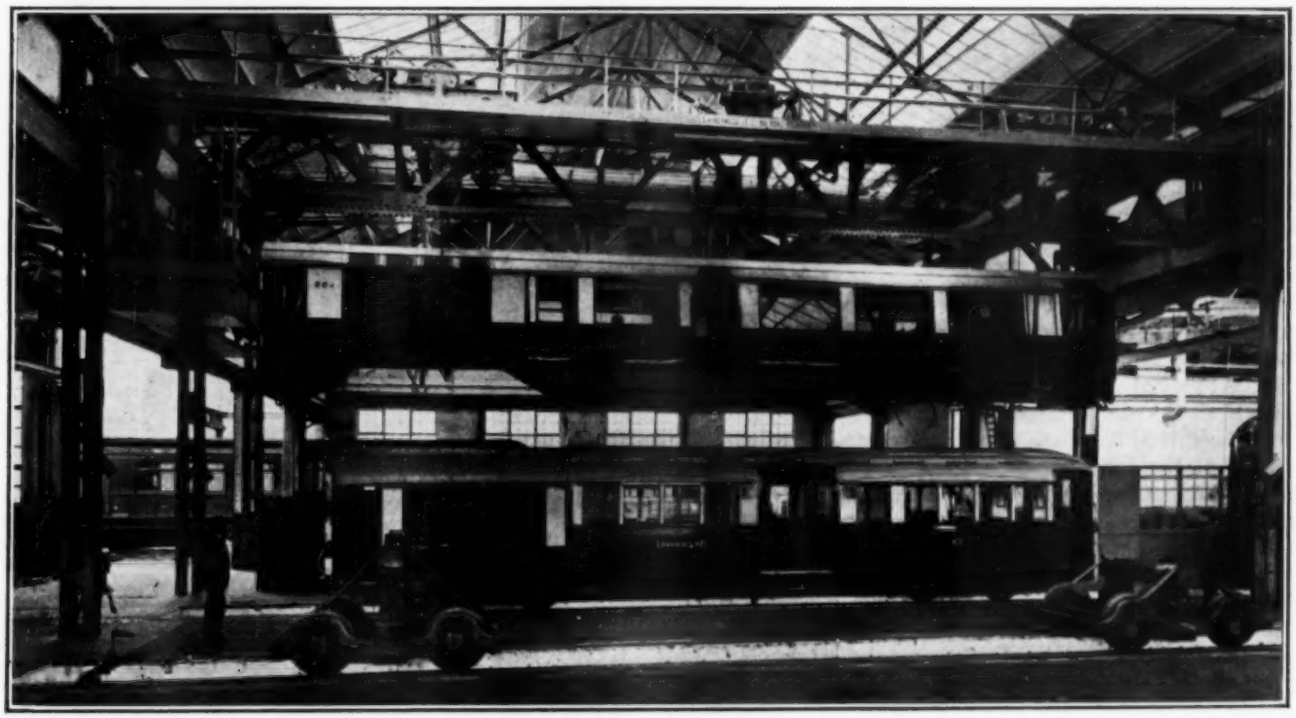


*Fig. 1—A 30-ton duplex crane having a 65-ft. span and independent hoisting-motors at each end. Both motors can be coupled together so as to be operated by a single control handle, and when so operated they lift the ends of a car body evenly, regardless of the distribution of the weight. Lifting is done by means of slings*

*Fig. 2—One end of the hoist, or dismantling conveyor, where the stripping of the trucks begins. Ample crane service is provided and the various parts are removed in succession, leaving only the wheels and axles when the conveyor reaches the other end. It will also be noted that lifting-truck platforms are used for temporarily storing parts*

entire shop is equipped with two electrically-operated conveyors, both of which are on the main floor level. One is for dismantling and the other is for reassembling the trucks. These two conveyors run lengthwise of the shop, but on opposite sides and in opposite directions, and travel at the rate of 7 in. per minute.

Between the two main conveyors, and at right angles to them, is a series of smaller conveyors which carry the parts that have been disassembled on the first conveyor to the reassembling conveyor on the other side of the shop.

After the trucks have been placed on the first conveyor, parts of them are successively removed by electric traveling cranes, where they are heavy enough to require it. By the time the trucks reach the end of the conveyor, there is nothing left of them but the wheels and axles. These parts are then removed from the conveyor by a hoist, and are sent to the axle and wheel section to receive such repairs as may be found necessary. The armatures, after being removed from the trucks, pass from stage to stage in their department, beginning with the stripping and reaching the end in a completely finished condition, ready to be reassembled in the truck. Dust is removed from the armatures by a jet of compressed air combined with an induced draft, and is collected in a suitable separator. The armatures are carried into the baking oven in lots of seven, on frames moved by electrically-driven haulage chains. Fig. 2 shows the dismantling conveyor with the overhead hoist for handling the heavy parts.

One of the cross-shop conveyors is shown in Fig. 3, and is the one used for handling truck frames and which moves at a speed of 10 in. per min. A 5-ton traveling crane covers this whole area and any part can be quickly removed from the conveyor, should it be found necessary. This section is also equipped with a flame-cutting plant, electric rivet heaters, an electric welding plant and other accessories for facilitating the work.

Another section of the truck repair shop is that devoted to wheels and axles, in which all repairs to both these parts are handled, including wheel truing and the removal of tires, axles and gears. At the entrance to this section is a special magnetic device for detecting flaws in axles, shown in Fig. 4. All axles pass over this device. A compressed air lifting mechanism is provided to raise the wheels off of the track while the axles are being inspected for flaws.

The machine shown in Fig. 5 is a pneumatic riveter for heading the rivets that hold the tire retaining-ring in place. It is a squeeze-riveter, the linkage being shown in front of the operator. The wheels rest on rollers and are positioned endwise by the tire flanges. The wheels are turned by the small motor shown near the floor. It will be noted that the entire machine rests on a concrete foundation surrounded by wooden blocks.

Reassembly of the trucks begins at the corner of the shop shown in Fig. 6. The track in the foreground is in reality one of the platform conveyors which has been covered with planking so as to be used as a working platform whenever necessary. The wheels in the foreground are placed at the proper center distances, and move with the conveyor instead of rolling as might be assumed. On reaching the position under the traveling crane, the truck frames are lowered over the axles, and from this point the parts begin to assume the appearance of car trucks. This view also shows the type of stands used for holding car brasses and other materials, and the runways for the smaller traveling cranes in the cross-lays.

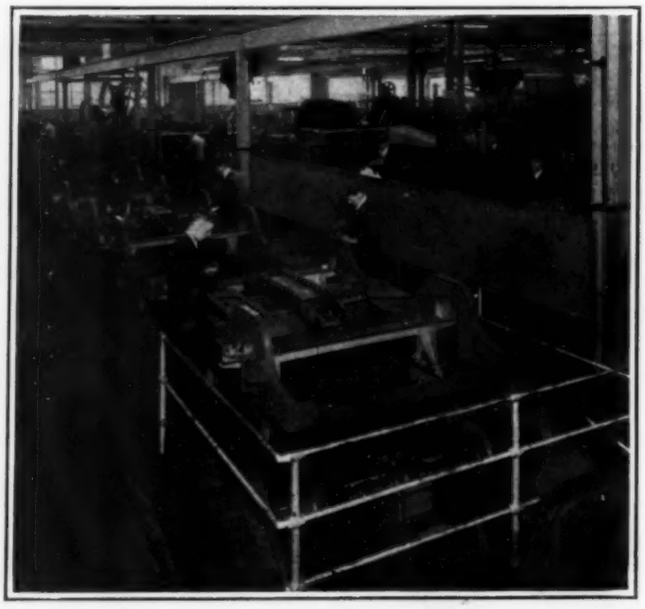


*Fig. 3—A cross-shop conveyor that is typical of nearly all the rest. This particular conveyor is for handling truck frames. Beside the conveyor are the welding and cutting booths where repairs of small parts can be made near the conveyor line. The conveyor is served by a 5-ton traveling crane, shown in the distance. The frames can be moved on or off the conveyor as desired*

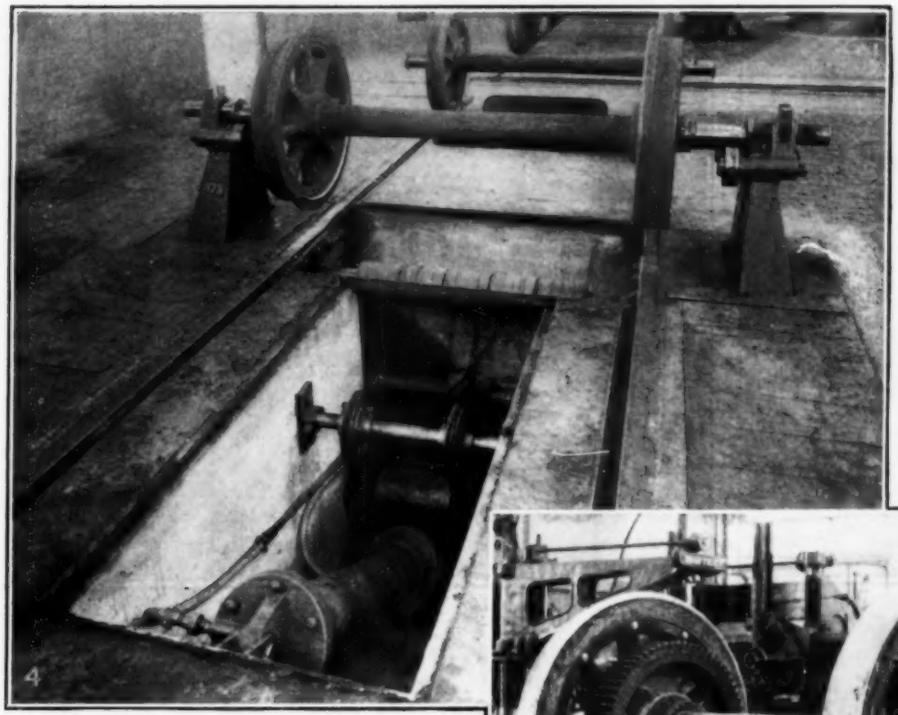
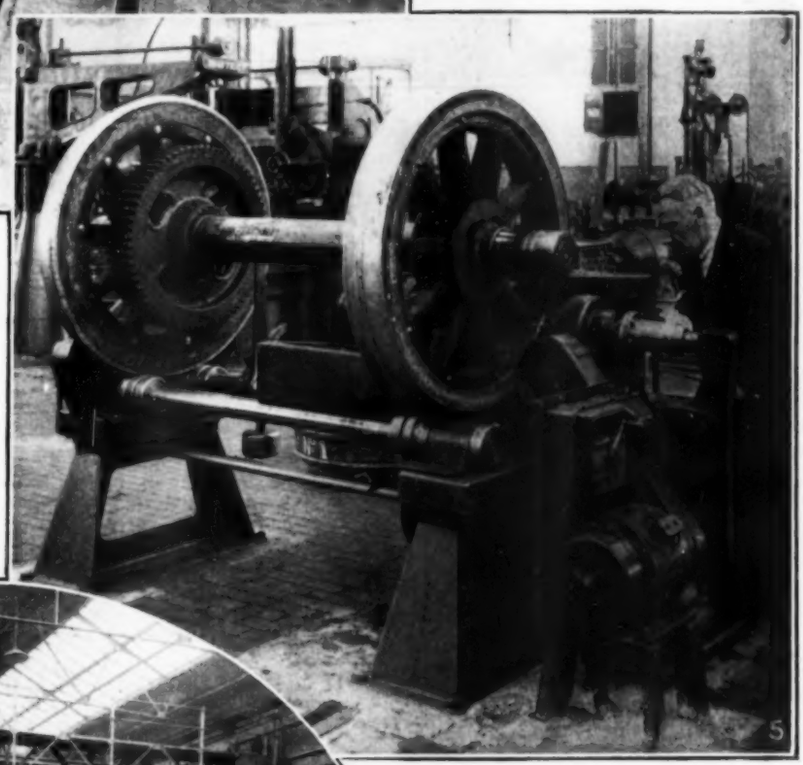


*Fig. 5—Pneumatic riveting machine for heading the rivets that hold the tire-retaining-rings in position. It is a squeeze type riveter, the linkage mechanism being shown in front of the operator. The wheels rest on rollers and are revolved by suitable gear reduction from the small motor near the base. The method of mounting machines on solid concrete foundations and the way in which the block flooring is fitted around the foundations, is shown*

*Fig. 4—Magnetic testing device for detecting flaws in the truck axles. A pneumatic hoist raises both ends of the axle so that the wheels clear the rail while the magnetic inspection is under way. The air cylinder that controls the hoist is located in the pit*



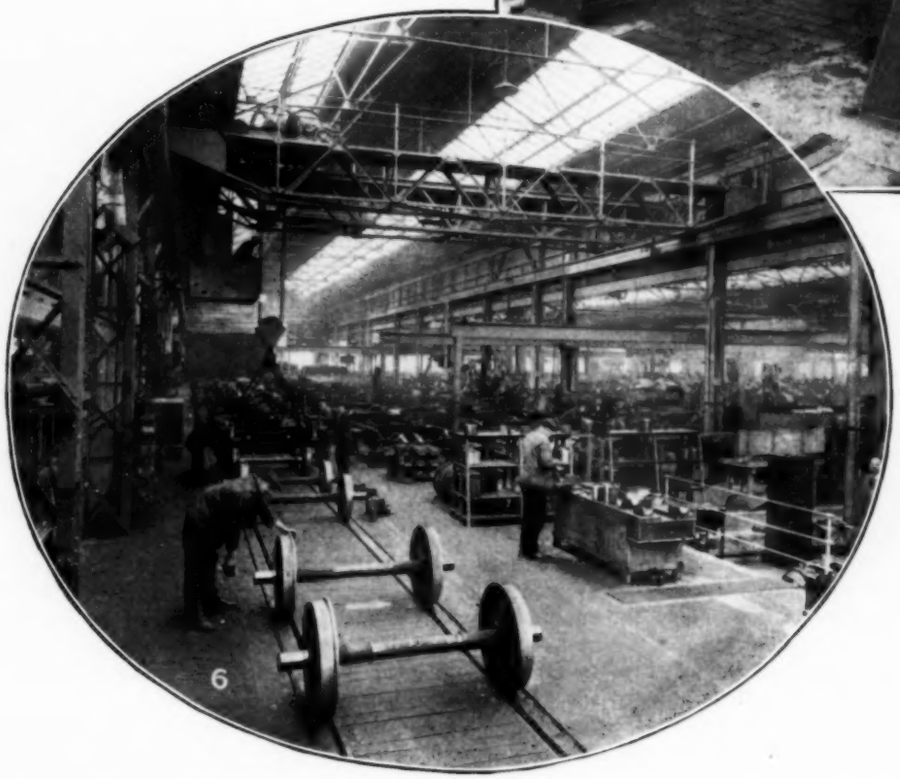


*Fig. 6 — The beginning of the re-assembling conveyor. Here the wheels and axles are being placed at the proper distance apart and, as the conveyor proceeds, the truck frames are lowered over them. The driving mechanism is then added as the conveyor moves at the rate of 7 in. per minute and the truck is complete when the conveyor reaches the other end of the shop*

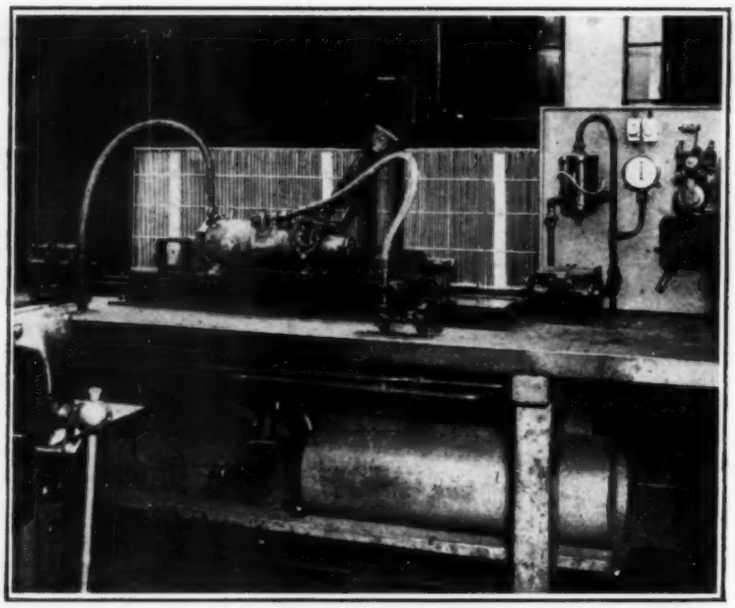


*Fig. 7 — Another cross conveyor for taking such parts as gear guards and other material from the dismantling conveyor to the line where they are reassembled. A side track, near the center of the illustration, is for shunting such pieces as may be necessary at this point. Fig. 8—Testing bench for the door-opening engines. Provision is made for clamping these units in place rapidly. The air-hose connections are conveniently placed and are provided with quick-acting couplings. Gages and other apparatus are conveniently arranged for the inspector*

One of the cross conveyors is shown in Fig. 7, this one being for handling gear guards and other miscellaneous parts on their way from the first, or entering conveyor, to the conveyor at the other side of the shop, where the trucks are reassembled. This view also gives a good idea of the type of racks used for holding materials. It will also be noted that there is a small, inclined track just in front of the man in the center of the illustration. The combination of rollers at the top of the side track and the incline, makes it easy to take pieces from the conveyor and shunt them from the line at this point.

Door-opening devices, or door engines as they are called, are all tested on the bench shown in Fig. 8. This bench is fitted with easily operated clamps so that the mechanism can be quickly put in place and removed. The air-hose lines are conveniently placed and are equipped with quick acting couplings. All necessary gages are provided to show that the mechanism is working properly.

A similar arrangement for progressive work is also applied in the body shop, where the conveyors travel at the rate of 10 in. per min.. Otherwise the method of operation is much the same. We are indebted to the London Underground Railways for the photographs from which the illustrations were prepared.

## Buy on Specifications—*Discussion*

By Harry J. Eiser

THE author of the article on page 248, Vol. 69, of the *American Machinist* gives an admirable presentation of the argument for specification buying from the purchasing agent's viewpoint. But against a too complacent attitude that once a specification is written the problem is solved, I would like to sound a warning from the viewpoint of the specification writer.

Convenient as it may be, the best results cannot always be attained by awarding the contract to the lowest bidder who accepts the specifications without reservation. The reputable manufacturer is constantly seeking to improve his product, and make it even better than is required by the specifications. But the growing practice of specification purchase has developed another small group of manufacturers who work not to improve their product within the specifications, but rather to cheapen it and still keep it within the terms of the specification. While the one manufacturer aims to incorporate better materials and ingredients into his product and still hold his price at the same level, the other spends his research energy in endeavoring to find ways and means of incorporating inferior materials into the product offered.

In writing a specification originally, it is not always possible to insert all the "shall not" clauses required to guard against the detrimental improvements that sharp minds may develop. So to circumvent the costly practice of learning by sad experience the purchasing agents cooperation with the specification man should be enlisted.

A first bid from a well known advertising manufacturer may be accepted with the same degree of assurance as that extended to an old supplier of proven merit. The concern that advertises realizes the value of its reputation. But when the low bid comes in from an unknown concern, the purchasing agent should request samples, and turn these over to the specification man for check before awarding the contract. If the sample proves up, the unknown obviously gets the contract. If he has found a way to slide an inferior product in under the terms of the specification, his bid is thrown out, the specification revised, and the contract awarded elsewhere.

Reputation based on past favorable experiences, should be a deciding factor when the price differential is small.

# Making the Most of Floor Space

ECONOMIC use of available floor space is a real problem in any shop. That is why Bill Holland was interested to sit in on a conference with Harry Young, the manager of the Young Manufacturing Company, and his shop executives.

"Got to have more floor space, Mr. Young, if we are to meet that new production program," said Frick, the super.

"And what does the production man say?" asked Young, turning to Hawley, who handles that end of the shop.

"I'm not so sure about more floor space being necessary if you will spend a part of the cost of a new building on new machine equipment," replied Hawley. "I don't like to seem to oppose Mr. Frick, but I've a notion that the smaller we can keep the plant the better. I believe that's one of Mr. Holland's policies, too."

"How about it, Bill?" asked the big boss.

"There's always at least two sides to a story, Harry. Neither Frick nor Hawley have mentioned rearranging the present equipment to get better output. I've known cases where shifting machines, moving some closer and separating others into groups, have made a noticeable reduction in shop costs."

"It doesn't pay to crowd machines together, Mr. Holland," said Frick. "You don't get good results unless men have plenty of room to work."

"That's largely a matter of opinion and shop conditions, Frick. Two notable examples of shops where men are crowded together are Ford's and Baldwin's. Yet both of them have found it possible to get out large production at a low cost. On the other hand, there are shops where each machine almost stands alone—and they make money, too. Generally speaking, however, you can work machines much closer together than we used to think. Floor space costs real money these days and you also save in the distance that the material has to be handled."

"But, Mr. Holland, just joining machines together doesn't give low-cost production," protested Hawley. "You've got to have good machines to get out the product at low cost."

"Of course you have to, Hawley. And no one advocates good machine equipment more than your Uncle William. But if I were Harry Young here I wouldn't hand out a wad of money for either a new shop building or new equipment, until I'd made a mighty careful survey of the whole situation. It's dollars to doughnuts that by rearranging your present line-up to get a more direct flow of work through the shop, and putting in some new machines where the old ones are choking the production line, you'll need less additional floor space than Frick thinks he needs.

"You might handle next year's production with your present floor space. But as you'll probably keep on growing, it may be well to begin active planning for more floor space. It isn't a question of seeing how little or how much floor space you can use, or of whether you spend money for building or machine equipment. What Harry Young has to consider is how he can spend his stockholders' money so as to get the best average return for them over a long period."

"But when you put your money into a new shop it's there, Mr. Holland. It's a valuable asset. Machine equipment gets out of date before you know it," said Frick.

"So do buildings to some extent," said Hawley. "And you have taxes to pay on them whether you are busy or not. Then there's always upkeep and a lot of other expenses."

"Money tied up in either buildings or machinery must earn its interest or you're out of luck," Holland replied. "Buildings do not become obsolete nearly so quickly as machinery. You must have modern machinery to compete in the cost of production. But you can't put all your cash into either buildings or machinery with complete success. Everything has to be balanced and Young has to consider both sides. He'll probably compromise between the two plans suggested."

"Gosh, Bill, you ought to be a banker or an 'impartial' chairman. You sit on the side line and then explain the mistakes like a Dutch uncle. It isn't always so easy to see them when you're in

the middle of things." Young was mildly resentful.

"Of course not, old man," returned Holland with a quizzical smile. You've hit on the reason why my reputation is what it is. If it weren't so easy I'd have no more reputation than 'the office boy,"—and the party broke up.

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Executives are invited to discuss the problem involved in the foregoing case. They are also urged to use this department to air their own problems. A letter to the Executive Forum Editor is all that is needed.

## *Discussion*

### Selecting Shop Executives

Ninety-nine times out of a hundred, the field in which to locate an executive for the shop lies among those already with the company. The one-hundredth case is one of the addition to an organization of an entirely different unit, such as a foundry or forge division, for which a qualified and experienced man is unlikely to be discovered in the personnel.

It is of prime importance for every shop, however small, that has hopes of future expansion, to be constantly on the lookout for those men in its employ who are mentally fitted to fill higher positions, and to train such men to that end in order that when the expansion period arrives, the wheels of the organization will turn smoothly.

The injection of a stranger, regardless of ability, into a position in which personal contact plays so great a part, is a staggering blow which the morale, and therefore the efficiency, of a shop force cannot overcome for many months, if ever. Within the hearts of most men, especially the best types, there lurks the thought that one day he will be boss. The sight of an outsider in the chair which he had hoped to occupy is direct evidence to his mind that the company has no regard for his or his mate's ability, and to make progress he had best find employment elsewhere. This unrest is one of the causes of shop turnover in skilled men, and unquestionably the constant breaking in of new labor is a decided detriment to even the finest tooled production factories.

There are no fast rules to act as guide posts in the choosing of a man for any position, and last of all would I depend on the judgment of a psychoanalyst who can know nothing of the details of the position in question. The physical condition and home life, as Mr. Holland states, plays a more important part in the efficiency of a brain worker than most people realize, and should be taken into consideration. The rest depends on the ability of the heads of the organization to estimate the qualities of their men.

—J. L. SPENCE, *President.*

### Royalties to Company Officials

The Board of Directors of the Brand Turbine Wheel Company are evidently somewhat short-sighted in not being able to reach an agreement with regard to compensation for their superintendent. It would seem that a percentage of the profits would be the best way of adjusting the matter, for the proportion received by the company and the man would always remain constant. Such a plan would lead the superintendent to use his genius to the fullest extent in devising ways and means of reducing manufacturing costs, as this would mean actual money in his pocket.

Although a court of law would, in all probability, uphold the company in claiming the pump, such action would leave a dissatisfied superintendent who might have other ideas that he would take elsewhere. The withdrawal of a superintendent for such a reason would have a bad effect upon the morale of the shop as a whole. The details of the transaction would surely leak out, and other ideas would be kept under cover. Although the members of the board could claim the superintendent was only doing his duty, as stockholders they would gain as greatly as he on something for which he alone was responsible.

—F. G. WILSON.

### Too Much Inspection

If each operation on a part is performed correctly, the part will be correct when finished. Therefore, process inspection is usually better policy than final inspection. In selective process inspection, the inspector has a definite number of operations for which he is responsible. He visits these periodically according to an arranged schedule. Spoiled work is caught and corrected immediately, and spoilage of the remainder of the lot prevented.

The passing of work only slightly outside of specified tolerances should not be left to the judgment of the inspector. The responsibility for this should be placed where it belongs, in the engineering department. The setting of tolerances is a highly important problem in itself, a sound solution of which may make or break a company. One automobile manufacturer had such close tolerances that his rejections were greater than the product passed by the inspector. The making of gages to his specifications was a laboratory job. He, of course, went under long ago.

In support of process inspection versus 100 per cent final inspection is the experience of

a manufacturer of small parts for medium sized, intricate devices. A final inspection force of eighty girls in a central room was replaced by a walking force of seventeen male process inspectors. The result was a better product with less spoilage, and lower cost of inspection.

—R. BEAVER.

A part that is run in large quantities at considerable cost, and that has to be held within close limits, must be inspected after each operation. Or, ten or fifteen pieces may be inspected every one-half hour or hour and this followed with a more complete inspection when the pieces are finished. When, however, the part requires only minor operations in jigs or fixtures, the inspection is entirely eliminated after the set-up man inspects and approves the first pieces run. After that the part checks itself in the jig which is used for the next operation. In large work, however, where only one or two pieces are being machined and the set-up time alone involves a day's work for a single operation it is well to call the inspector before tearing down. In a good many cases it is impossible to set up the machine in the same position. —A. C. NOLKE.

We are all brought forcibly, and perhaps at some cost, to realize when we have had too little inspection. The other extreme is more difficult to determine.

For general manufacturing of automobile parts, we have found that a good thorough inspection on all tools, jigs, and gages, and then one common sense line inspector for every ten operators, checking up on their work at intervals and using all the fastest and most accurate gages possible to buy or make, works out very well in preventing large quantities of inaccurate or spoiled work from being finished and then scrapped. Since the line inspector cannot possibly check very many units out of the production, we have found that it pays to have all work go through a final inspection department after it is completed and giving a 100 per cent inspection. By this we mean not 100 per cent of every figure shown on the blue print, but that every unit is given a thorough inspection of all vital tolerances and limits.

In other words, the line inspector's duties are to see that no large quantities of work are spoiled and that all work passed on to other operations has sufficient stock in proper locations to finish up. Consequently, the line inspectors must be men with a great deal of mechanical experience. They must be able to visualize the roughed or unfinished units as finished, and to judge accurately if the stock left at various points will be sufficient to finish up, and if it is in the correct location.

Beside this, the line inspectors must be diplomats, so that they can reject work made by piece-workers and still keep friction to a minimum. If they are working in a shop where the inspection department checks up all piece work and O.K.'s time tickets, they must also be somewhat of a bookkeeper, in order to keep their clerical work straight so that no one will be short or over paid.

A good line inspector must be quite a clever fellow to keep himself out of trouble from day to day. The final inspectors, however, can be quite another type. Their work is more or less of a routine job after it has been decided how much and what to inspect 100 per cent.

—O. H. HARRISON.

## How Much to Invest in Fixtures

Whenever a new line is started, I have found it the best policy to make the cheapest temporary fixtures possible for a few machines. Many details can be machined without fixtures at all for the first one or two machines. My company once received an order for six special machines of a type which it had never built. I was instructed to go ahead with tooling. After all tooling had been completed at an estimated cost of $10,000, the company decided to complete one machine. After completing this one machine and a large number of parts for others, the machine was redesigned as much as 30 per cent. Jigs and fixtures had to be re-machined, rebored, and altered here and there so that we had tools and fixtures that were not very serviceable. Costly tools for the first machines should be discouraged at every opportunity. —PAUL LINDNER.

## Getting Ideas from the Men

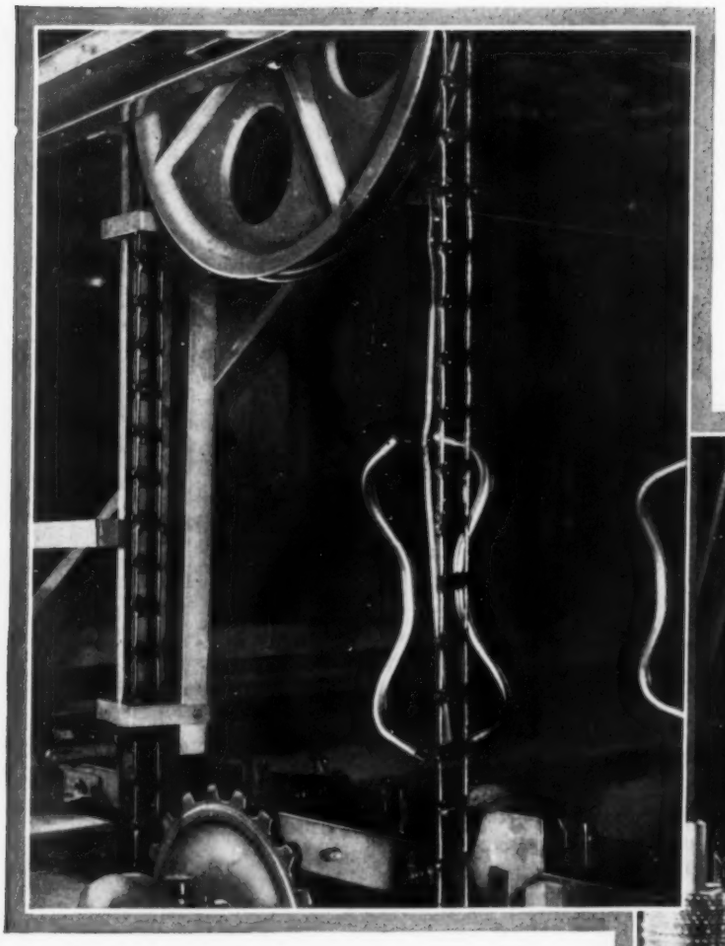
It is quite a common argument against the use of suggestion boxes that no worth-while suggestions result. This depends largely on the attitude of the management. The men from whom suggestions are expected are not technically trained, and suggestions should be looked upon not as suggested improvements, but rather as suggestions as to where improvements could be made. A suggestion consisting of some weird mechanism that appears entirely unconventional may be submitted. Perhaps the man's constant association with the problem has enabled him to hit upon the best design to be made. Every suggestion should be given careful consideration, since the workman may get a valuable idea which on the face appears useless.

Perhaps a better method of obtaining ideas would be to encourage the men personally to take the ideas to the works' manager. In this way, the men will feel that their suggestion is getting home. Even if it proves worthless, the men will feel better about it than they would have by way of the suggestion box. By paying the men a definite percentage of the weekly saving that is being effected by their suggestion, satisfaction is felt by both employer and employee.

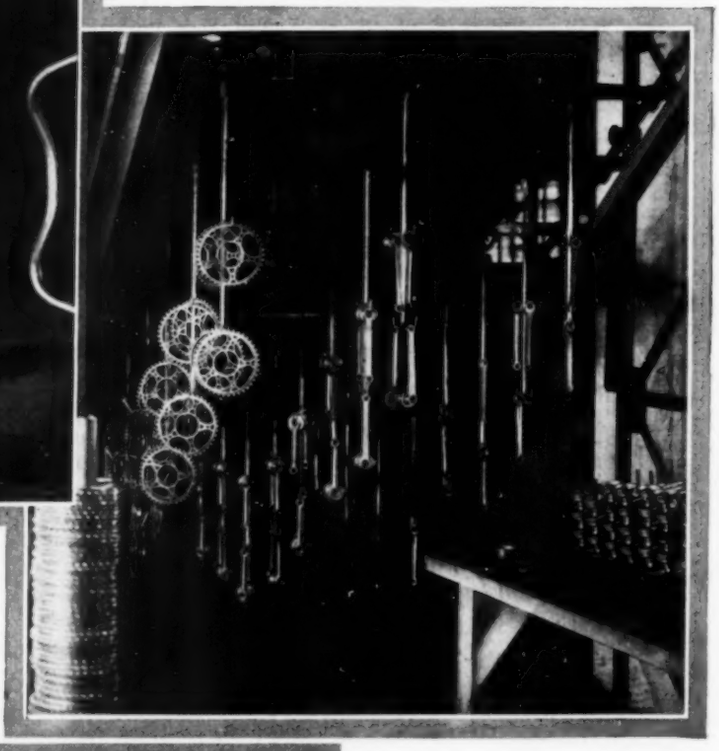
—R. L. EINNIM, *England*.

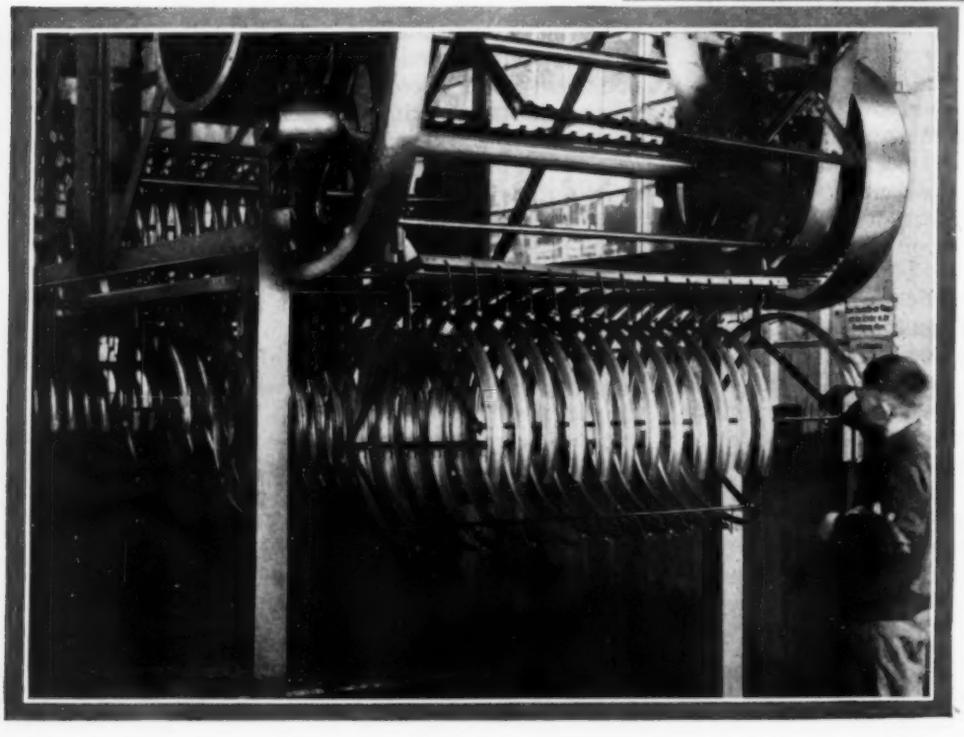
# *Automatic and Lacquering in a German*

Photographs by courtesy of the Opel Works, Rüsselsheim



Handle bars suspended from the cross-bar of the automatic plating machine being lifted from one bath into the next by a vertical chain. The bars drop into the notches in the horizontal chain and are carried along by it while the work is submerged

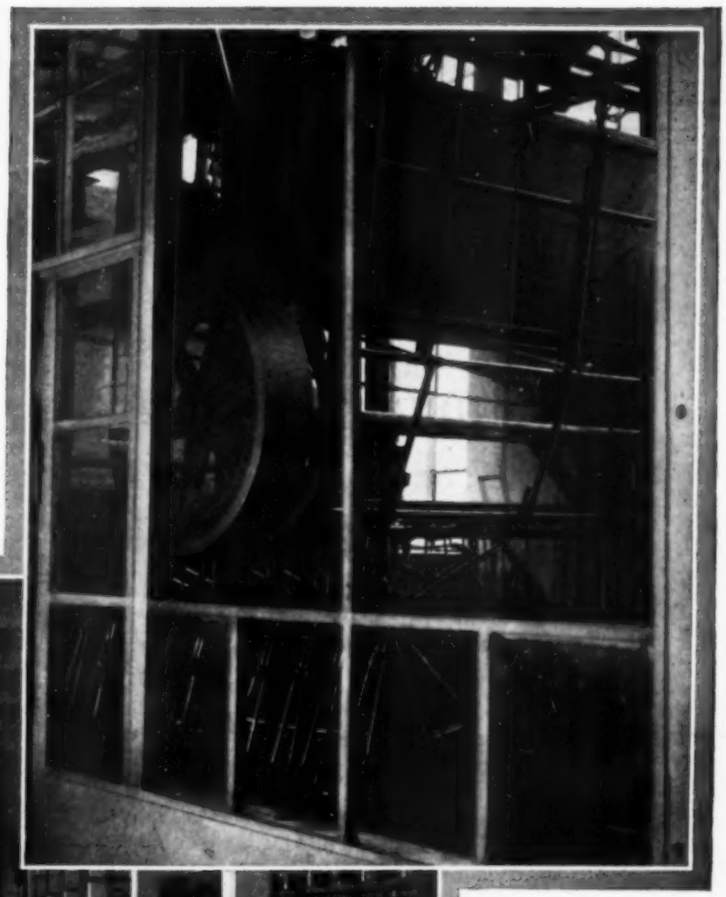




Bicycle sprockets and cranks suspended from hooks which in turn are suspended from the cross-bars of the automatic plating conveyor

Unloading a rack full of lacquered mudguards. The conveyor operates on much the same principle as the plating conveyor

# *Plating Equipment Bicycle Plant*



Bicycle frames and forks going through the automatic lacquering machine. The only manual work involved is the loading and unloading of the conveyor

Work from the lacquering machine, which is behind the windows at the right, is inspected before being sent to the stripers

Finished frames, forks and mudguards are brought to the stripers who put on the decorations by hand

## · THE · FOREMAN'S · ROUND · TABLE ·

*The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions at the foot of the page have been prepared*

# *Equipment and the Foreman's Reputation*

"HERE'S a hot one, Al. You remember Bill Jenks, who used to work for me and then went to the Metal Fittings Company to be foreman? He always was more or less nutty, but this beats 'em all."

"What's it all about, Ed?"

"Bill writes me that he quit his job—and you can't guess why! Because the boss wouldn't buy him some new machine equipment. Can you beat it?"

"Just what does he say? It may not be so crazy as it sounds right off the bat."

"I'll read it to you. It's crazy all right. Here's what he says: 'I've quit the job because the old man wouldn't put some of his earnings back into the plant. We had a good year but some of the machinery is on its last legs and is likely to go blooey any time. Then the old man will want to know what ails me because we lose money. He'll blame me and not the old machinery.'"

"Nothing so very crazy about that, Ed. But go on—I'm interested."

"'I told the old man,' Bill writes, 'that he ought to be ashamed to keep some of these machines out of the cupola. They've saved him many a dollar since they paid for themselves, but he'll lose money fast if he doesn't buy a lot of new equipment. He told me my business was to run what machines he gave me and to get the most out of them. If he didn't choose to buy new equipment, it was his business and not mine.'"

"And what did Bill say, Ed?"

"Bill told him that no self-respecting foreman would play nursemaid to a lot of decrepit machines that ought to have been junked years ago, especially as he could well afford new ones. He says, 'I told him if he was hard up I'd try and help him out as I have in the past, but I'm risking my rep to stick around with an outfit that is dying because the boss won't loosen up and buy new equipment when he can well afford it.' Seems to me he's a bit high hat to quit on that account, Al!"

"I'm not sure but that Bill is dead right, Ed, though few of us have the nerve to throw up a job under the circumstances. The old man would blame him if he failed to make money next year when the fault might easily be due to his old equipment. Bill would have a lot of explaining to do if he tried to get another job. He's in a better position now to land a really good position than he would be if he'd waited to be fired—or even bawled out for failure."

*Is Al right in thinking that a foreman may be held responsible for a poor showing when the fault is poor machinery? Do you agree with Ed that Bill Jenks was wrong to quit because he couldn't have new equipment? Should the foreman coddle old machines and say nothing?*

All foremen are urged to discuss these questions vital to their work; of course the

discussion is not limited to foremen. Letters accepted and published will be paid for

# *Discussion of Earlier Topics*

### Should the Men Support Their Own Club?

INTEREST is pretty well linked up with ownership. The young man who has the privilege of the family automobile of expensive make, will take a great deal more interest in the first second-hand Ford he owns himself, than he ever did in the family car. A shop club in which the company pays all the bills can never be really popular with the men. Human nature regards anything which comes for nothing as being a subject for suspicion.

MICHEAL J. KAPLIN.

A CLUB house is bound to fail unless the basic wage of the plant is right. If the workers see that the club is costing the firm a considerable amount of money, they will be likely to demand that the money be put into their pay envelope. Clubs cannot be operated except as employees' organizations. It is necessary that steps be taken, when they are organized, to prevent internal politics from wrecking the project. If all the fundamental conditions be right, there is no feature of welfare work that will do more to cement the mutual understanding of all elements within the plant than will the club.

—J. BINDER.

IF THE company wishes to bear most of the operating expense, any surplus money collected from the men can be used for entertainments, disability funds, or similar purposes. One concern finances the club entirely, but charges each member twenty cents every week. This money finances a system whereby a member receives a certain sum each week that he is out of work through sickness or accident. Another firm furnishes the club with heat, light, and other necessities, but allows committees selected by the workers to finance and direct the club's activities. Some premium should be placed upon membership to impress the men.—A. R. KLINE.

ALTHOUGH the employees' club may be formed primarily for purposes of entertainment and social affairs, it is likely, if wisely guided, to serve also as a means of fostering ideals of good workmanship and good citizenship. As much initiative as possible should be left to the workers.

As an aid in helping the men support their club, some revenue-raising features such as billiard tables, refreshment tables, and soda fountains may be operated. It is best to have the club house managed under a representative plan whereby the club management is left to a joint committee of employees and officials. —JOSEPH BELL.

## THE · NEXT · TOPIC

***A Chance to Grow***

ADVANCE QUESTION

*The statement has been made that only in the United States is there an equal chance for all. Is this so? If so, is it so vital as some people claim?*

### Putting One Over on the Builder

IT IS not necessary to take such a radical view on the question of broken machine tools parts. It was wrong for Parker to put oil on the broken piece, but it was also wrong for Al to go after Parker too severely. A great many of our machine operators have views as to the parts they think are weak and need improving.

There should be an understanding that broken parts be sent to the builder's factory for inspection, with frank suggestions and information as to how it happened. Most companies are glad to receive returned parts and to give detailed reports to open minded customers. In fact this practice often results in important changes in design. —DEANE B. CALDWELL.

MECHANICS who break a tool box through overloading the machine, or by continuing to tighten a screw with a large wrench long past its proper position, will, many times, try to cover up their fault by blaming the breakage on a poor casting. They will sometimes doctor the fracture with grease to make it look like an old flaw at this point.

The foreman should insist that when a break occurs he should be notified immediately, so that he may make an examination of the tool box before it is even removed from the machine. If a metallurgist is available in the organization, the block should be submitted to him for microscopic examination. If it is reasonably certain that there was a flaw, the casting should be returned, together with a statement of the examination made and the circumstances under which the break occurred. Then you have a fair, ethical practice that is certain to retain good will, and give the manufacturer a square deal.

—LEWIS J. YAPP.

### Wear Goggles or Quit

"MY GOGGLES were in my tool chest and it was only a ten minute job," is an excuse frequently given for not wearing goggles while dressing tools. In such instances, the writer suggests the following scheme:

Install a small metal box (8x10x4 in. is a good size),

having a hinged door and a couple of shelves, near each group of grinders. Keep in this box several pairs of goggles provided by the company and kept clean and in good order by an attendant from the first-aid division. A notice should also be placed on the box to the effect that the company expects every man to use the goggles.

—J. W. HUCKERT.

WHEN a man hires out as a machinist, he understands that he will be called upon to use tools and appliances supplied by the employer, and that while in the shop he will be governed by the rules and regulations of the shop. If he finds the shop conditions too unpleasant he may exercise his right to find employment elsewhere. If goggles have been supplied by the company, there should be no call for enforcement of Williams' ruling in the matter. —T. PILKINGTON, *Canada.*

THE foreman of every shop should post signs regarding protection of the eyes. Talks and motion pictures on safety also help. Not only that, but the foreman should see that safety rules are carried out. Of course, he should do this in a kindly way that will show his interest in the men. A good shop is judged not only by its output, but also by the number of yearly accidents. Every foreman's aim is to decrease the amount of accidents each year. If more people would help him, accidents would keep on decreasing until we would have a safe industrial world. —M. V. DUMIRE.

WILLIAMS is putting it a little too strong when he posts a notice to the effect that any man using the grinder without wearing goggles will be discharged. This order will be enforced for a short while, and then forgotten as such orders usually are. If the grinder is provided with guards, as it should be, it is not necessary for the workmen to wear goggles every time they use the grinder. It is a lot of trouble to some men to wear goggles. Besides, one can see much better without them when grinding small tools. The experienced man knows when he ought to wear them, and he will do so without being told. Williams means well, but he acted a little hastily when he had this notice posted.

—WM. J. OWENS.

I DO not believe in any one suffering for the sake of affording an example to others. The men who wear the goggles know far more about the discomfort of wearing the ordinary stock goggles than those under whose direction they are working. Few men are safety boosters until it is made comfortable for them to be so. Due to the fact that no two faces have ever been found that are exactly alike, it is hardly to be expected that a package of uniform goggles will fit all faces equally well. The do not, and the wearer's ability to adjust them to himself is often far from satisfactory. Would it not be to the interest of all concerned for the employers to both instruct the workmen in the necessity for wearing goggles, and also make sure that each pair is fitted to the workman?

I believe that many of the minor eye injuries are caused by small particles that are allowed to work in, or are rubbed into the eye by the workman's own soiled hand, handkerchief, or some part of his garment carelessly used in wiping around his eyes. The workman should be instructed on this point also, as dust and injury sometimes cause him to suffer hours after it is done. Perhaps it wakes him up in the middle of the night, and he is unable to connect the trouble with any action on his part. —JOHN MARK MAY.

## Do Brains or Beef Count Most?

THE presence of the foreman on the job at all times is not necessary if he has an understudy upon whom he can rely. Provided the foreman can be present sufficiently often to attend to any important shop problems, to lay out the general policy of the shop, and to see that his own or the management's orders are carried out, he should be able to trust an understudy to carry out his orders and to maintain discipline. Under present day conditions the foreman is less concerned with the discipline of the shop than formerly, and is more concerned with the technical side of maintaining the output. It is good policy to retain a foreman, who has worked for a firm for years, when he falls into bad health, for he understands the work better than any understudy or newly engaged foreman can hope to do.

—W. E. WARNER, *England.*

## How Much to Spend for Repairs

A MACHINE may be in fairly good repair for the general run of work, but require adjustment and replacement of worn parts for a special job. Part of the cost might then be charged directly to the special jobs, and the rest to the upkeep of the machine. When a broken machine is needed urgently, and a new machine is not available in time, a high repair cost is sometimes justified.

As a general rule, if the estimated cost is not more than 2 per cent of the original cost of the machine, the foreman should go ahead with the repairs. If the repair cost is between 2 and 15 per cent of the original cost of the machine, the repairs should be referred to the superintendent, and if over 15 per cent and the machine more than four years old, the cost of a new machine should be considered carefully. —A. F. GUYLER, *England.*

## Standards for Machine Finishes

IN THE majority of cases, unless the machinist knows knows the exact requirements of the job, he is at a loss to know what finish to produce. In such cases, unless he is a man who is accustomed to the roughest class of work only, he will produce a good finish. The wrong finish on the work invariably means a loss of time and money.

The choice of the finish cannot be left to the judgment of the worker if the best results are to be obtained. It should not be left entirely in the hands of the inspector, as he cannot inspect a surface until after it has been produced, when the time will already be lost.

In the small shop, it may be possible for the foreman to inspect the work and issue instructions while the cut is being taken. In the larger shops, it will be necessary for the foreman to instruct the workman before the job is started. In some cases, a mere statement, "rough" or "fine finish" will be sufficient; in other cases, some standard is necessary. —R. H. KASPER.

# Inspection Methods and Their Application

By Fred H. Colvin
*Editor, American Machinist*

**Crankcases are probably tested in the rough more than any other automotive parts—Representative methods in several plants are given**

CRANKCASES, being large castings, especially in the case of straight-line 8-cylinder engines, require more care in rough inspection than most of the smaller parts. Whether the crankcase and cylinder block are cast in one piece or separately, there are chances for shrinkage and core movement that might interfere with the casting cleaning-up at some point. For this reason, some plants provide rather elaborate fixtures for inspecting castings before machining. Some of the illustrations show the combined cylinder block and crankcase of cast iron, while others show separate crankcases of aluminum. The Franklin crankcase is a separate unit from the cylinders and carries the seven crankshaft bearings. The casting is inspected very thoroughly before going to the machine department, so as to avoid loss of time in case of its failure to clean up at all points. Quite an elaborate fixture is used for the main inspection, as can be seen in Figs. 62, 63, and 64. The empty fixture is shown in Fig. 62, with the test bars representing the crankshaft and camshaft, in place. The angle plate at the left, is a contour gage, as are the sheet-metal plates on which the face of the crankcase rests. The angular blocks *A* help to locate the crank-

The first part of the sixth article. The conclusion will appear in an early issue.

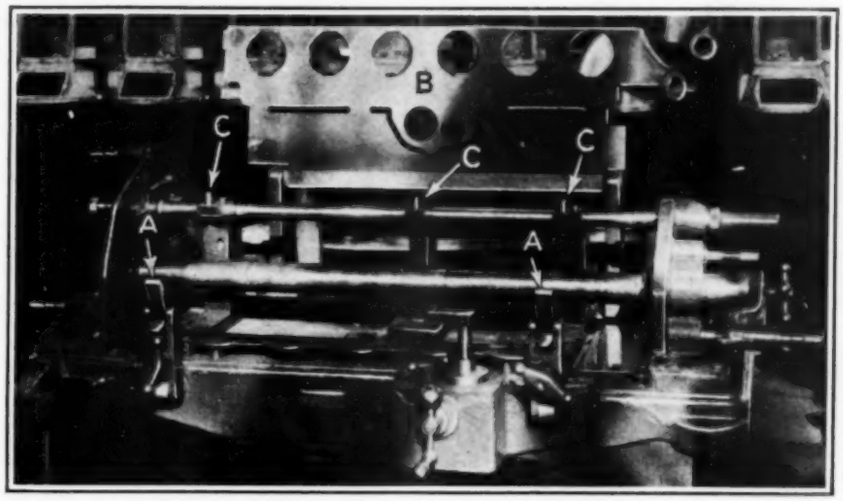
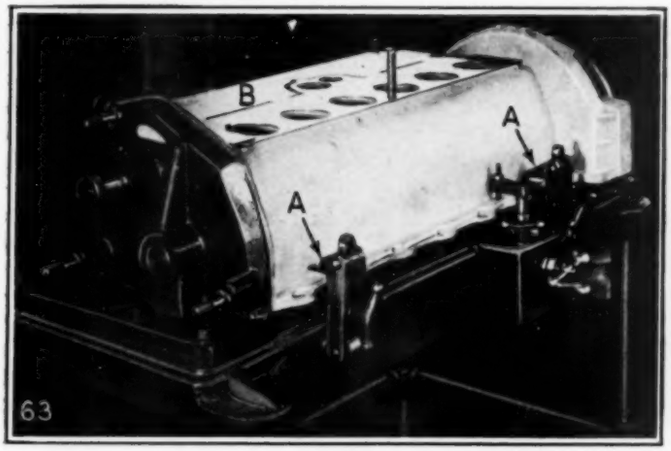



*Fig. 62 — Fixture used by Franklin for inspecting aluminum crankcase castings. The large bar checks the position of the different main bearings. The perforated plate at the top checks the crankcase outline*



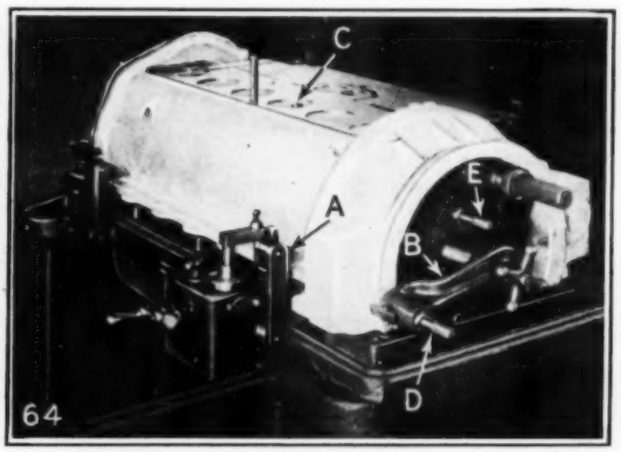




*Fig. 63 — Crankcase casting in position, showing the provision for side adjustment, should this be necessary in order to have the different surfaces clean up. The gages are mounted on substantial stands which can be moved whenever desirable. Fig. 64—Checking the bell-housing end of the crankcase. The arm at the end of the central bar swings around the bell-housing flange, and the plugs shown check the length of the casting*

case in position, as can be seen in Figs. 63 and 64. The hinged contour-plate *B* swings down over the top, or cylinder surface, the outlines indicating the projections of the crankcase that house the pump and the timing distributor. The studs *C* show the height of the cylinder surface.

The crankcase is in position in Fig. 63, which shows the use of the hinged locating blocks *A*. The blocks are adjustable, being carried in swinging links. The metal left for machining the ends is checked by the plugs in the end of the fixture, which act as flush-pin gages and indicate the amount of metal to be removed. The method of gaging the other end of the crankcase is shown in Fig. 64. Here the arm *B* on the bar, representing the crankshaft, is swung around the end of the casting to check the amount of metal to be machined for the bell housing of the transmission case. The metal for facing is checked by a flush-pin *D* in the end of the arm Another pin of this kind is shown at *E* for checking one of the inner surfaces. This view also shows the object of the pins *C* which were shown in Fig. 62. The ends of these pins represent the plane of the finished surface for the cylinders, and, with the hinged top plate thrown back out of the way, it is very easy to see the amount of metal left for machining.

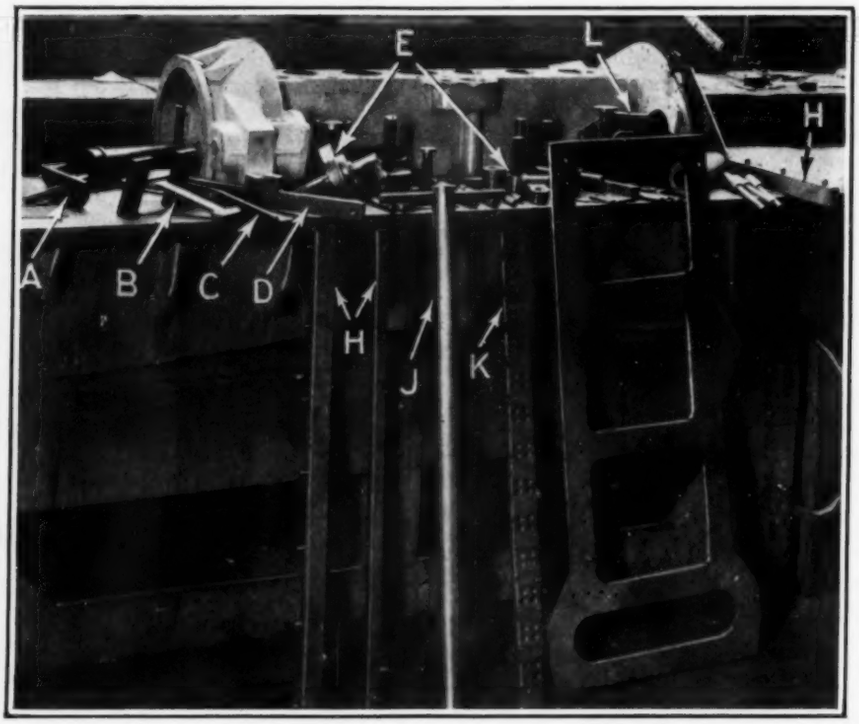



*Fig. 65 — Gages for checking the finished crankcase. The inspection is made with the casting resting on a substantial surface plate. The plate is well ribbed to prevent deflection, and is mounted on a bench that brings it to the same height as the adjoining work bench on the right*

Some of the gages used in inspecting the finished crankcase are seen in Fig. 65. Gages for checking bearings, whole diameters, face diameters, and other special details are included. The gages check the following dimensions: *A*, clearance in crankcase for lugs of the baffle plate; *B*, from top of case to center of bearing; *C*, clearance of engine rail; *D*, from No. 1 crankcase bearing to front face of crankcase; *E*, for distance from camshaft bearings to pump-shaft hole; *H*, for spacing stud holes for crankshaft bearings; *J*, alignment gage for camshaft bearings; *K*, for spacing crankshaft bearings; *L*, for spacing holes in baffle plate.

The inspection is made on a heavily-ribbed surface plate that rests on a bench of the proper height to bring it flush with the adjoining benches. It can, however, be easily moved to any other location should it seem advisable to do so, due to any rearrangement of shop layout.

A rather elaborate fixture for aluminum crankcases of six-cylinder engines is shown in Fig. 66. This fixture is from the Yellow Sleeve-Valve plant. The crankcase is supported at suitable points, and various targets and gages used to determine whether or not there is sufficient metal for machining at the essential points. The flat bar *A*, for example, allows the checking of the crankshaft bearing supports in the cross-ribs of the crankcase. The gage *B* is moved from point to point to check the various bearing supports. Targets *C, D, E, H, J, K, L,* and *M* all check different portions. If the crankcase passes this inspection, it is sure to clean up when it comes to the milling operation. Some of the targets are guided by steel strips on the base plate as shown. One of the most important items in finished crankcase inspection is to be sure that the end which receives the bell housing of the transmission case is faced square with the bore of the main bearings. It is also important to see that the bore is concentric with the bearings, so as to locate properly the transmission case when it and the crankcase are bolted together in the assembly department. In some engine designs, this surface, or at least part of it, is on the crankcase casting. In other designs, as in Fig. 67, the connection with the transmission case is made by a separate casting bolted to the cylinder block. The method of inspection is much the same in either case.

A close-fitting test bar in the main bearings, and carrying a dial indicator with its spindle in contact with the machined face is revolved, and any variations are noted. At the same time, it is customary to use a similar indicator in the bore of the flange, so as to detect any eccentricity that may exist.

Where the main bearings are part of the crankcase, instead of the cylinder block, the inspection takes on the character of that given to the cylinder block in most cases. An instance of this is shown in Fig. 68, where the center distances between the various bearings are being checked by means of special test bars. The bars fit in the main bearing, the camshaft bearing and the bearing for the generator. Each bar carries an accurately-

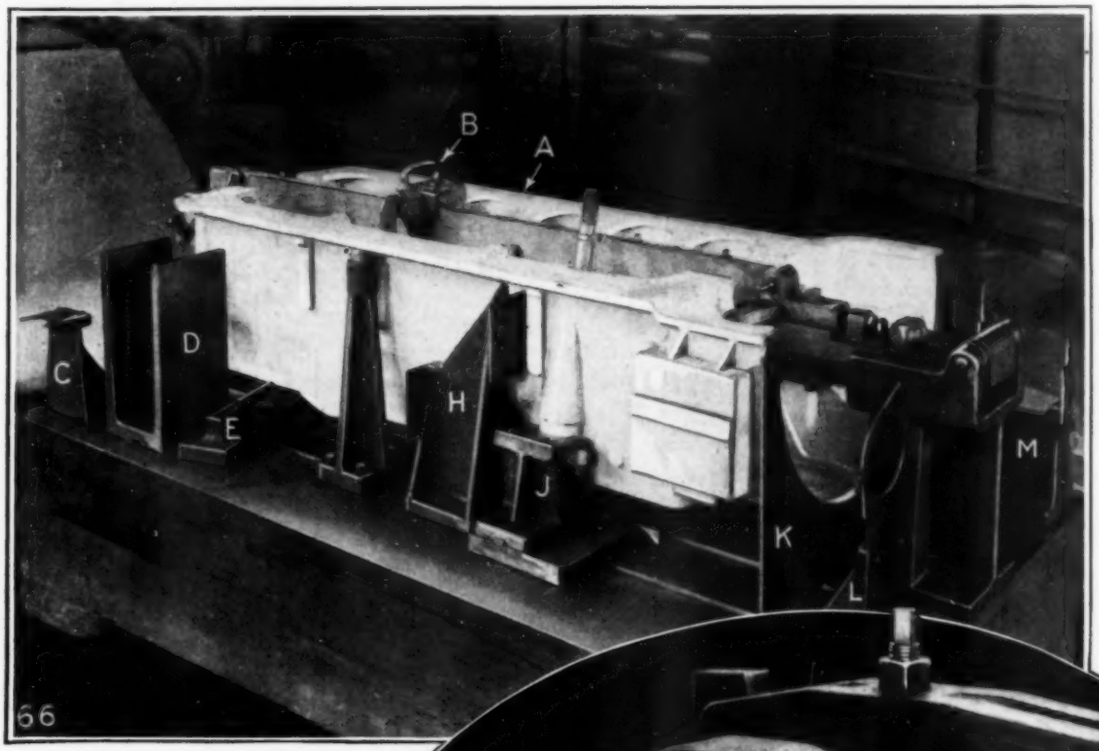
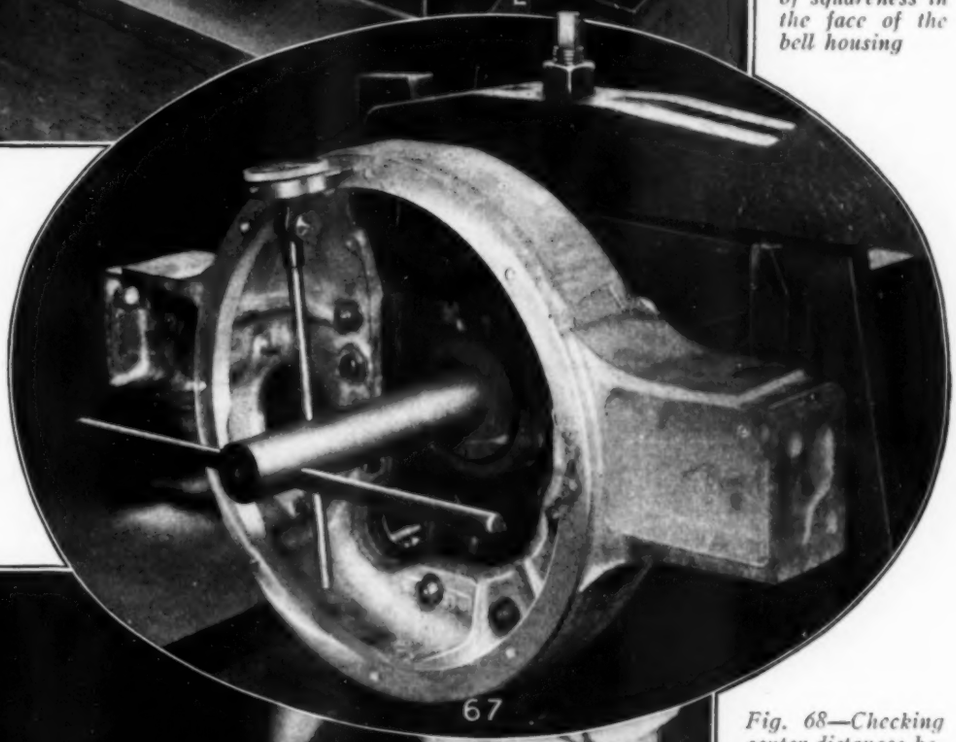



*Fig. 67—Checking the bell housing after assembly to a Marmon cylinder block. The dial indicator is supported at the end of a long test bar that fits all the main bearings, so that it is easy to detect any lack of squareness in the face of the bell housing*

*Fig. 66 — Inspecting a crankcase casting at the Yellow Sleeve - Valve plant. The center bar gives the locations of the main bearings, and the various target gages indicate clearly whether or not there is sufficient material for machining. Gages of this kind save a lot of unnecessary work by preventing a waste of time in machining poor castings*



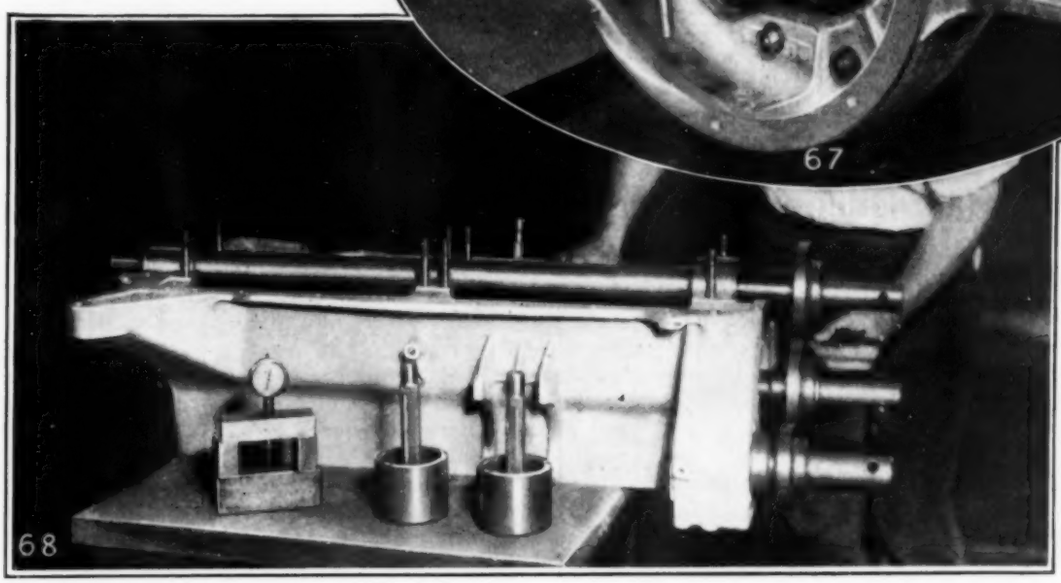




*Fig. 68—Checking center distances between shafts on the Marmon engine. Each disk represents the pitch line of the corresponding gear, and the inspector checks the distance between them with a suitable feeler. In this way, the center distances can be carefully checked so as to insure proper running of the gears*

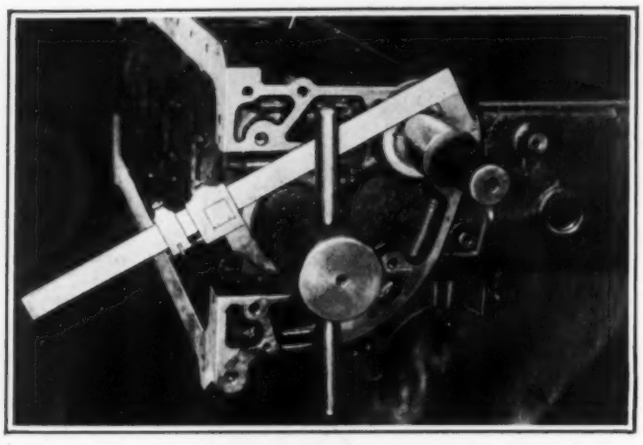


*Fig. 69—Another method of checking center distances in the Marmon plant. Standard plugs are used in both shaft holes, and a large vernier caliper is employed to measure the distance on the outsides of the testing plugs. When two shafts only are to be considered, it is a simpler method than the one shown in the previous illustration*

turned disk having a diameter equal to the pitch diameter of the gear that is to be mounted in that position.

With the bars in place, the distance between the disks is checked by feelers as indicated. If the disks are found to be the proper distance apart, there is likely to be little difficulty from noisy gears after the engine has been assembled. The other gages shown are for different bores in the crankcase, while the one at the left is a convenient depth-gage used in checking counterbores and similar recesses. The gages in both Figs. 67 and 68 are from the Marmon plant.

Another method of checking the center distances is shown in Fig. 69. This is also from the Marmon shop, but is the method used on the 8-cylinder engine. Standard mandrels are used as before, but, instead of having disks representing the pitch diameters of the gears, a large vernier caliper is used, and the overall distance between the mandrels is measured. In order to secure the center distance, it is, of course, necessary to subtract one-half the diameter of each mandrel. In determining the correctness of the measured distance, however, one-half the diameter of each mandrel is added to the desired center distance, and if the mandrels measure within the required tolerance, the holes are passed as being correctly spaced.

## The Real Product of the Drafting Room

By John F. Hardecker

MOST people, if asked what a drafting room produces, would regard the question as rather obvious, and answer it by stating: "Why, drawings, of course." But in the machine trade this is not the correct answer—the really useful product is blueprints, not drawings. And strange to relate, good appearing drawings do not necessarily produce good blueprints, particularly where the prints are made directly from pencil tracings, which is the growing tendency.

The best tracing papers, or pencil tracing cloths, from a drawing viewpoint do not always make the best prints, particularly at the speeds it is desirable to run the blueprint machines. A careful analysis of several grades of paper or cloth with respect to their ability to take pencil lines as well as the resultant blueprints, will help to establish the best compromise in a given case.

When the best paper or cloth has been successfully selected from this viewpoint, a further improvement may be obtained by studying the coatings used on the blueprint paper itself with respect to the tracing paper or cloth used. This work requires expert knowledge, and can be best accomplished by calling in the blueprint paper manufacturer and having him try out blueprint papers of different coatings with your tracings on your own machines. Here again, the speed of the blueprint machines enters in, and they may have to be operated at higher or lower speeds for best results. This is determined by experiment.

Fortunately, while this appears to be quite a bit of work, it has to be done but once, for as long as the same tracing paper or cloth and the same blueprint paper are used, the findings hold good. To anyone who has been making his selections of papers and cloth in a haphazard fashion, the improvement in the quality of the blueprints will be a pleasant revelation—and after all it is blueprints with which the mechanics work, and the best are none too good when soiled by the grease and grime of the shop.

## Importance of Specifications
### *Discussion*

By Samuel J. Bavis

THE comments, by A. L. Walker on page 205, Vol. 69, of the *American Machinist*, touch on a subject of world wide interest. With the rapid development work that is going on in all materials to-day, specifications are of paramount importance. Not only should the material be produced commercially, but, for a given type of material, there should be complete agreement in the industry as to all details of chemical and physical properties. This is essential if special heats are to be avoided, and if minimum prices and quick delivery dates are to be obtained. Unless the industry can agree on an analysis, it is hopeless for the mill to attempt to stock the material.

The work of writing material specifications should not be delegated as a mere routine to a draftsman, but should become the function of the best technical brains of any organization. There is no single item which affects so large a volume of product as these basic specifications for raw materials. A drawing usually applies only to a single item, even though its volume runs into the thousands. A specification for steel or brass may affect hundreds of such items, each running into a volume of thousands of pieces.

Relatively slight differences in the wording of a specification may spell the difference between open competitive purchase, and purchase closed to competition. Fortunately, this situation is being recognized, and practically all engineering societies now take an active part in fostering standardized material specifications for the raw materials of their industry. The value of this work and the need thereof cannot be too highly stressed.

# Hob Corrections for Gear Tooth Modifications

By James A. Hall

*Consulting Engineer, Brown & Sharpe Manufacturing Company*

**The author concludes his analysis of straight-line corrections, gives a method for the determination of the entrance angle, and illustrates it by the use of charts**

CARRYING out the method of analysis given in the first part of the article, we have determined the values of the involute angle for 14½-, 20-, and 22½-deg. pressure angles for a series of addendum percentages varying from 0.6 to 25. Corresponding values were figured for possible correction involutes up to 30-deg. angle by about 2-deg. steps. The angular differences in radians between the regular tooth involute and the correction involutes were then determined for each of the three standard pressure angles and plotted by 1-deg. steps, the intermediate values being filled in by

The second part of the article. The third will appear in an early issue.

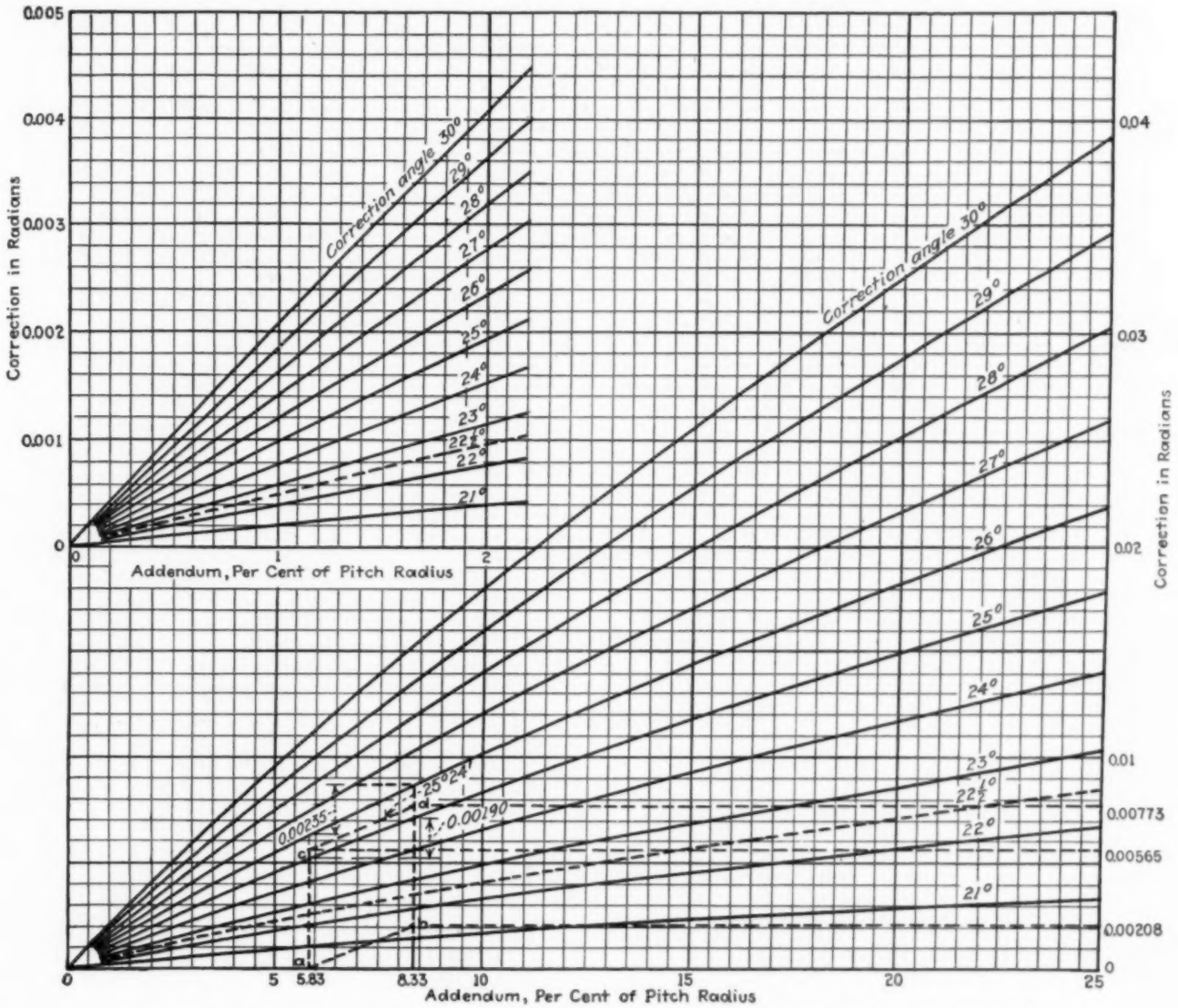



*Fig. 6—Tooth correction diagram. Straight-line correction on hob for correction pressure angles of 21 to 30 deg. and 20-deg. base angle*

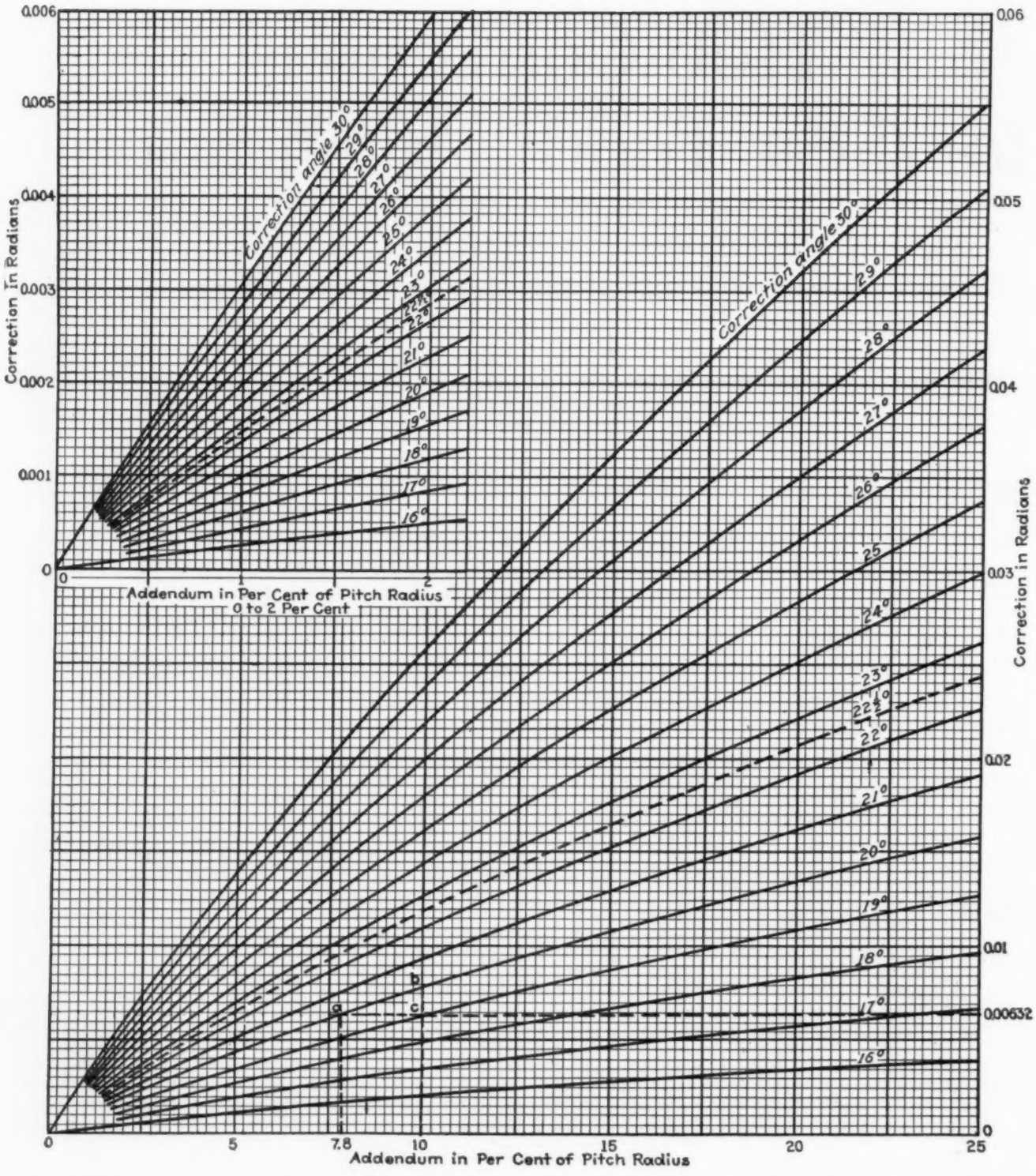



*Fig. 5 — Tooth correction diagram. Straight-line correction on hob for correction pressure angles of 16 to 30 deg., and for 14½-deg. base angle. To use the diagram, mark on the correction angle line the pitch-line correction in radians at* a *and the addendum in per cent at* b. *Project lines horizontally from* a *and vertically from* b *until they meet at* c. *The radial correction is then* ac *and the tip correction is then* bc *in radians*

interpolation. In Figs. 5, 6, and 7, these curves are shown.

The use of these diagrams can be illustrated best by giving the procedure for solving two types of problems. The same symbols are used as in the early part of the article: pressure angle = $VP$; correction angle = $VC$; addendum = $A$; working addendum = $WA$; radial correction = $RC$; tip correction = $TC$; normal correction = $NC$; working addendum of rack = $RWA$; pitch-line correction = $PLC$ = distance intercepted on pitch line by the tooth curve and the correction curve extended; pitch radius = $PR$; entrance angle = $VE$; outside radius = $OR$.

*(A) Given a 2-pitch, 14½-deg. pressure angle, standard addendum hob with a 20-deg. correction angle start-*

*ing 0.300 in. from the pitch line, what radial and tip corrections would be cut on a 20-tooth pinion?*

1. Determine the pitch-line correction ($PLC$) on the hob.

$$PLC = RWA \times (\tan VC - \tan VP)$$
$$= 0.300 \times (\tan 20^\circ - \tan 14\tfrac{1}{2}^\circ)$$
$$= 0.0316 \text{ in.}$$

2. Determine the pitch-line correction on the pinion in radians:

$$\frac{PLC}{PR} = \frac{0.318}{5} = 0.00632$$

3. Give the addendum in percentage of pitch radius:

$$\frac{A}{PR} = \frac{0.500}{5} = 0.100 \text{ or } 10 \text{ per cent}$$

4. On Fig. 5, which gives the tooth correction diagram for the 14½-deg. involute, mark on the correction angle line and the pitch-line correction in radians at *a*, and the addendum in per cent at *b*. Project lines horizontally from *a* and vertically from *b* until they meet at *c*. The radial correction is then *ac* in units of per cent of pitch radius, and the tip correction is then *bc* in radians. To convert the latter to inches, it must be multiplied by the outside radius.

| | |
|---|---|
| $a = 0.00632$ radians | $= 7.8$ per cent addendum |
| $b = 10$ per cent addendum | $= 0.00775$ radians |
| $RC = 0.022 \times 5.0$ | $= 0.110$ in. |
| $WA = 0.078 \times 5.0$ | $= 0.390$ in. |
| $TC = (0.00775 - 0.00632)\ 5.5$ | $= 0.0079$ in. |

This hob would cut a radial correction of 0.110 in. and a tip correction of 0.0079 on a 20-tooth pinion. By comparison, it is interesting to note that on a rack the corresponding figures are 0.200 and 0.0211 inches.

*(B) Wanted a tip correction of 0.009 in. and a radial correction of 0.100 in. on a 24-tooth, 20-deg. pressure angle, c-pitch, standard-addendum pinion. What correction is required on the hob?*

1. Give the tip correction in radians:

$$\frac{TC}{OR} = \frac{0.009}{4.333} = 0.00208$$

2. Give the addendum and the working addendum in per cent of pitch radius:

$$\frac{A}{PR} = \frac{0.333}{4} = 0.0833 \text{ or } 8.33 \text{ per cent}$$

$$\frac{\text{WA}}{\text{PR}} = \frac{0.333\text{-}0.100}{4} = 0.0583 \text{ or } 5.83 \text{ per cent}$$

3. On Fig. 6, which gives the tooth correction dia-

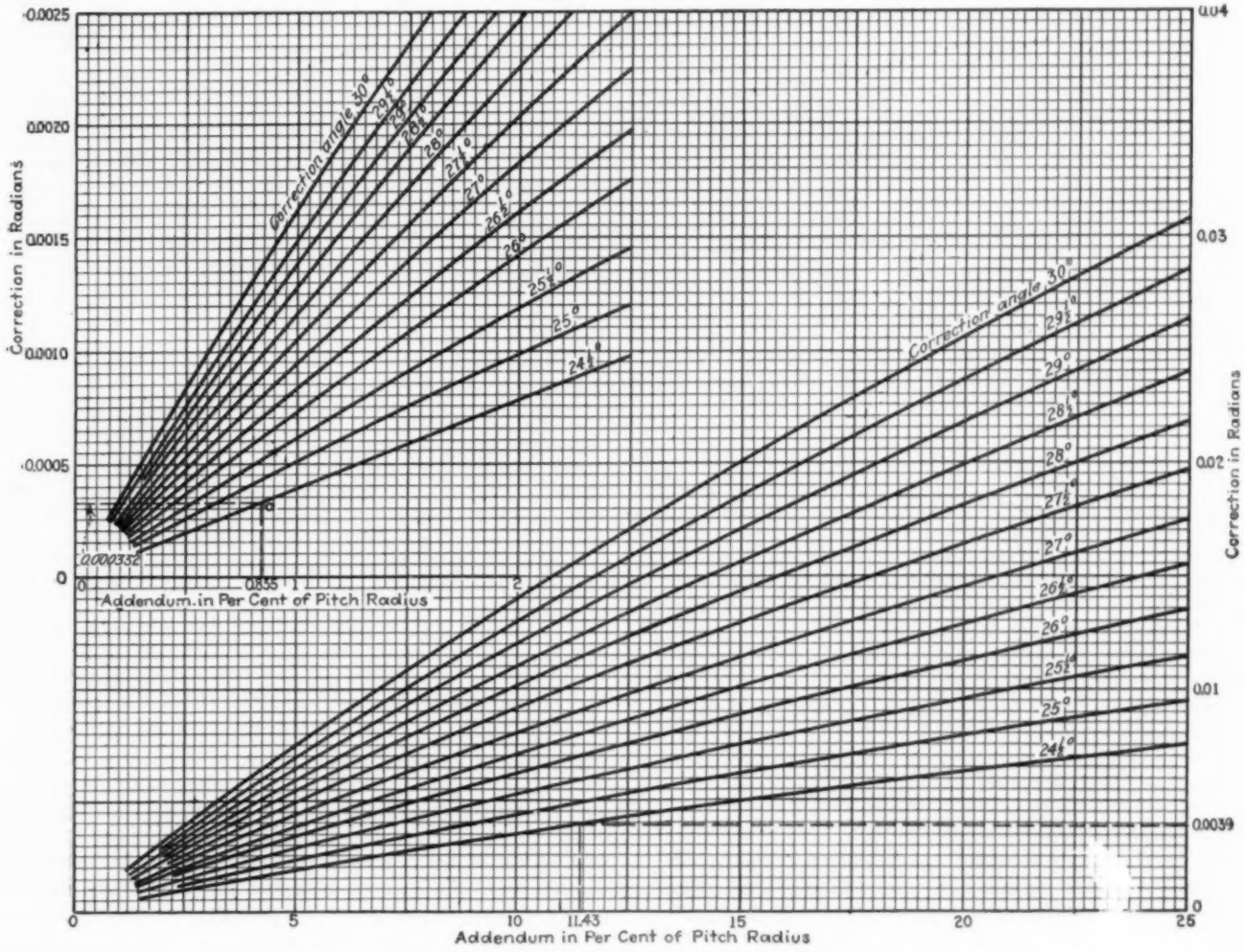



*Fig. 7—Tooth correction diagram. Straight-line correction on hob for correction pressure angles of 24½ to 30 deg., and for 22½-deg. base angle*

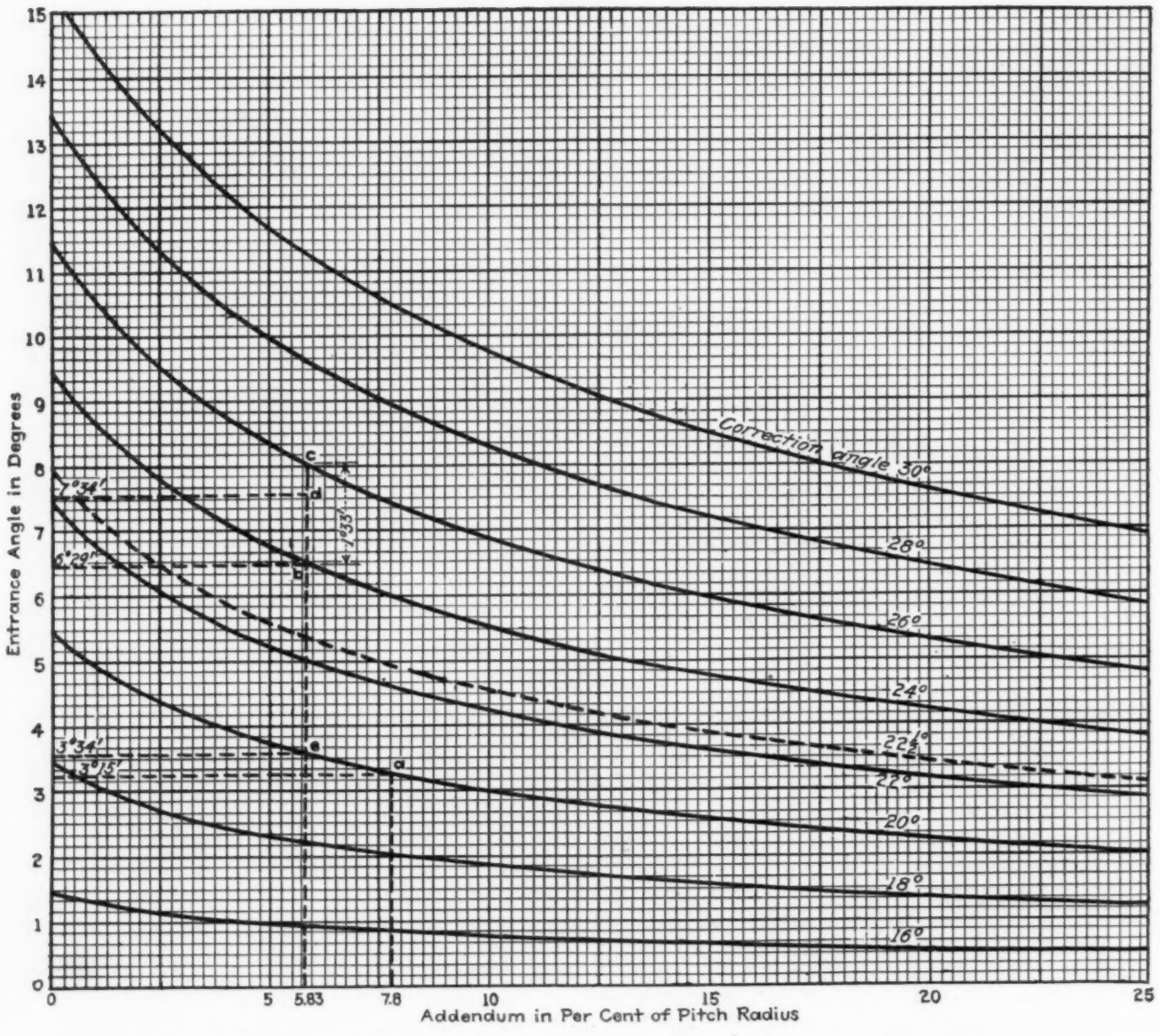



*Fig. 8—Entrance angle between tangents to involutes at intersection, using 14½-deg. base angle*

gram for the 20-deg. involute, draw vertical lines at the addendum and working addendum percentage values and find what correction angle will give the tip correction in radians between these two lines. To do this, draw the line *ab*, *a* being at zero radians and 5.83 per cent and *b* at 0.00208 radians and 8.33 per cent.

Moving this line up parallel to itself, we find that the slope is greater than the 25-deg. line and less than the 26-deg. line. By interpolation, the difference in radians between the two percentage lines is 0.0019 for the 25-deg. line and 0.00235 for the 26-deg. line. Hence:

$$\text{VC} = 25 + \left(\frac{0.00208 - 0.0019}{0.00235 - 0.0019}\right)$$

$$= 25.40 = 25^\circ\ 24'$$

4. To get the distance from the pitch line at which the correction angle starts, draw in the 25-deg. 24-min. line *cd*, 24/60 of the way from the 25- to 26-deg. line. The pitch-line correction is then *c* in radians, or 0.00565 which can then be multiplied by the pitch radius to give the value in inches; thus

$$\text{PLC} = 0.00565 \times 4 = 0.0226 \text{ in.}$$

$$\text{RWA} = \frac{0.0226}{(\tan 25^\circ\ 14' - \tan 20^\circ)} = 0.210 \text{ in.}$$

A hob having a correction angle of 25 deg. 24 min. which starts 0.210 in. from the pitch line will cut the desired relief on a 24-tooth pinion.

## Entrance Angle

As noted earlier, the passage of tooth contact from the relieved portion to the regular involute should not be characterized by too great a change in direction. Otherwise, there is apt to be too much impact at this point, and there may not be any contact on the relieved portion of the curve. The entrance angle, therefore, is an important figure in the discussion of straight-line corrections.

The angle made by a tangent to the involute and a radius drawn to the point of tangency is calculated in terms of the pressure angle as one of the intermediate steps in deriving the correction diagrams. If these tangent angles for a given pressure angle, say 14½ deg., and

for a given correction angle, say 20 deg., are subtracted from each other for corresponding values of addendum in per cent of pitch radius, the angle between the tangents, or entrance angle, can be plotted against the same base as the previous charts. Fig. 8 shows these entrance angle curves by 2-deg. steps for a 14½-deg. pressure angle.

Separate charts were not plotted for the 20- and 22½-deg. pressure angle systems. The set of curves furnished can be used for these gears, however, by using the method of problem *D* below.

The following problems are given to illustrate the use of Fig. 8 on the preceding page.

*(C) Determine the entrance angle of the 20-tooth pinion given in problem A.*

This pinion has a 14½-deg. pressure angle and a 20-deg. correction angle. The working addendum is 7.8 per cent of the pitch radius. Drawing a vertical line at 7.8 per cent addendum until it reaches the 20-deg correction line at a, we find the entrance angle to be 3 deg. 15 minute.

*(D) Determine the entrance angle of the 24-tooth pinion of problem B.*

This pinion has a 20-deg. pressure angle and a 25-deg. 24-min. correction angle. The working addendum is 5.83 per cent of the pitch radius. Drawing a vertical line at 5.83 per cent, we find the entrance angle based on 14½ deg. to be 3 deg. 34 min. for the 20-deg. line, 6 deg. 29 min. for the 24-deg. line and interpolating between the 24-deg. and 26-deg. lines, 7 deg. 34 min. for the 25-deg. 24-min. correction angle.

As this value is based on a 14½-deg. pressure angle, the actual value wanted is found by subtracting the reading for the 20-deg. line; thus

$$VE = 7^\circ\ 34' - 3^\circ\ 34' = 4^\circ$$

# Companionate Prosperity

## *The Road to General Prosperity*

By Edward A. Filene
*President, Wm. Filene's Sons Company*

ONE of the most noteworthy developments of our "business age" is the fact that "love your neighbor" which has been preached through the ages as a religious, moral and ethical principle and necessity has in the development of capitalism become the only sure basis of continuing prosperity. This may sound as if it were the statement of an idealistic preacher instead of the considered judgment of a hardheaded business man.

Great as is our present prosperity, it is only an indication of what our prosperity might be. For any one of us to enjoy the greatest possible permanent prosperity we must all—every one of us—be highly prosperous. That is, we must have what I call companionate prosperity. We can achieve this only through increased use of the new scientific methods of mass production and mass distribution, with the resulting low costs and high wages. These methods have caused our present prosperity; but even yet there is not enough general buying power to enable mass producers to sell all of the goods which they can produce.

### United We Prosper

The employees of unprogressive concerns have not the buying power they would have if their employers used the new scientific methods which would enable them to pay higher wages and yet reduce their costs. The present unemployment is at bottom largely due to the failure of many concerns to adopt them. So long as any important group of our people is not prosperous, we cannot as a nation be continuously prosperous to the greatest degree. And we cannot all be prosperous unless scientific mass methods are generally used in practically all lines of business. This fact can be expressed by paraphrasing a slogan which was popular when this nation was being formed, "United we prosper, divided we fail."

Let us consider for a moment just what prosperity is. The total national wealth—capital—does not make a people prosperous. Business is an exchange of goods and services. Business is prosperous when large amounts of goods are being exchanged. An individual wage or salary earner is prosperous when he is able to exchange his services for a comparatively large amount of goods. It is obvious that the amount of goods he can secure for a day's work depends first upon the amount of wages he gets, and, second, upon the price he has to pay for the things he wants to buy. The higher his wages and the lower the prices of the things he buys, the more prosperous he will be. The new scientific mass methods make it possible for manufacturers and distributors to pay increasingly higher wages and yet simultaneously to reduce costs and prices.

### A Specific Example

Let us consider a specific example of how companionate prosperity works. Ford among others follows a policy of paying unusually high wages for high production. His employees have more than the usual purchasing power, by virtue of their high wages, even when they buy goods which are made and distributed by the old uneconomical ways. But when they buy goods which are produced and sold at low prices by the new mass methods, their buying power, which is to say their prosperity, is still more greatly enhanced. Thus as a result of this increased buying power they indirectly give employment to other workers and so increase *their* prosperity, making it possible in turn for them to buy more and give jobs to still others.

Companionate prosperity is adversely affected in a plant which has not adopted economical mass methods. Its production is necessarily low, due to the methods the worker is forced to use. So are his wages for it is a fact recognized by progressive labor and business leaders that high wages can come only from high production.

It should be more clearly understood that it is lack of

Abstract of an article in the *New York Times*, Aug. 19.

buying power which causes business depressions, and that the greater and more general we can make the buying power of all the people, the greater will be the prosperity of all of us.

It is a striking and important fact that in times when, because of lack of all-around prosperity, large numbers of people are anxious but unable to buy things they want and need, there usually are at the same time large quantities of goods in the warehouses and on the shelves which producers and distributors are equally anxious to sell and equally unable to sell.

This is the situation which has come to be called "over-production." Actually there can be no such thing as general over-production. It would be more accurate to speak of the condition as "under-consumption." Over-production implies that there is a definite limit to the amount of any goods that the consumers will buy. Actually so long as prices remain high and wages low there may be such a limit—but who shall say how much of anything any person will buy when high wages and low prices make it possible for him to buy as much of it as he would like to.

### Waste in Production

The report of Mr. Hoover's Committee on Elimination of Waste in Industry, which stated that half of the cost of production was caused by preventable waste, has stimulated many progressive producers to determined attacks on the wasteful methods in their own plants.

Secretary Hoover recently pointed out the wastes in distribution as follows: "We have made far less progress in reducing costs of distribution than we have in production. As an indication of this; if we take the factory and the retail prices of commodities at 100 for 1914, we find that today factory prices are from 140 to 150 while the retail prices are from 165 to 170." I may add that the retail prices of 1914 were needlessly high.

Another source of waste is the undue number of middlemen whose profit and cost of doing business add to the price which the consumer must pay. To a great extent the reason for the middleman is found in the large number of small stores which cannot buy in sufficient quantities to enable them to buy directly from the manufacturers and must therefore depend upon a middleman for their supplies of goods. All of these manifest wastes in distribution reduce buying power and so tend to keep us all, manufacturers, distributors and consumers from enjoying as great a degree of prosperity as we might.

How great this waste in distribution is, is indicated by Dr. Julius Klein, director of the United States Bureau of Foreign & Domestic Commerce, who states that it is conservatively estimated to be between 7 and 8 billion dollars a year.

The farmer is an essential element in companionate prosperity, and he must be prosperous if the rest of us are to prosper to the utmost. His prosperity can be increased to a great extent by the use of better and more scientific methods, especially by the use of electric power.

### The Influence of the Tariff

It can also be increased by reducing the prices of the things the farmer must buy. If tariffs were lower that would be possible. I am not, and never have been, an advocate of free trade, for in the pioneer stages of American business protection was doubtlessly advisable. But mass production makes it unnecessary. I believe you will agree with me that even if we now had free trade or a very low tariff, yet no automobiles would be imported that could compete successfully with such cars as the Chevrolet and Ford.

Of course a country as large as ours can prosper for a while on its own prosperity. But as I have already said even now mass production methods are producing surplusses of some kinds of goods beyond even our present power to consume. That reduces the prosperity of the producers and of their employees and so reduces the prosperity of others in other businesses in the ways I have explained. As the new scientific methods become more widely adopted we shall from time to time produce surplusses of many kinds of goods. Then we shall have to turn to other countries to find an outlet for the surplusses if we are to retain our prosperity.

But how are those other nations to find the wherewithal with which to purchase our goods? Obviously they cannot buy from us to the greatest possible extent unless they too are prosperous.

### We Must Help Other Nations to Be Prosperous

Like ourselves their prosperity depends upon high wages and low costs. For them as for us high wages can come only from high production. The conclusion should be clear—that foreign producers and distributors must use the new scientific methods of mass production and mass distribution if they and we, are to become in the greatest possible degree prosperous. It is therefore to our interest to help foreign countries adopt the mass methods which have made us prosperous. This is contrary to the idea held by some of the less farsighted American business men who fear that if foreign business men become as efficient as we are they will, because of the lower wage scales usual in their countries, be able to compete disastrously with us at home and abroad.

But that implies that foreign business men will not grasp, as we have, one of the fundamentals of mass methods, which is that the success of concerns engaged in mass production or mass distribution is dependent upon employees having a high buying power which results from high wages. There are already, in Europe, business men who fully understand that fact. There is no reason to believe, once mass methods begin to be adopted abroad on the scale on which they are already used in America, that the wage scales will not be raised.

The achievement of companionate prosperity will, it is plain, mean much more than a mere increase in happiness resulting from everybody owning more of the things they would like to own. Although, if greater happiness were all that resulted the effort would be worthwhile.

But it is far wider and more important. By raising the general standard of living the cause of peace will be forwarded. Wars are largely if not entirely due to economic causes. Nations usually go to war in the hope of securing economic advantages by conquest or because the economic conditions within the country are so bad as to cause so great discontent as to threaten internal troubles or revolution.

Peoples who are prosperous and happy do not lightly go to war, nor do they grasp at irrational remedies like communism and extreme radicalism, with the feeling that any change is apt to be for the better. When mass methods with the resulting high wages and low prices are generally in use it will be apparent even to the least thoughtful that intelligent self interest operating through the capitalistic system has achieved all or more than is claimed for a communistic organization of society. Happiness, good health, leisure for the better things of life, and peace will result from companionate prosperity.

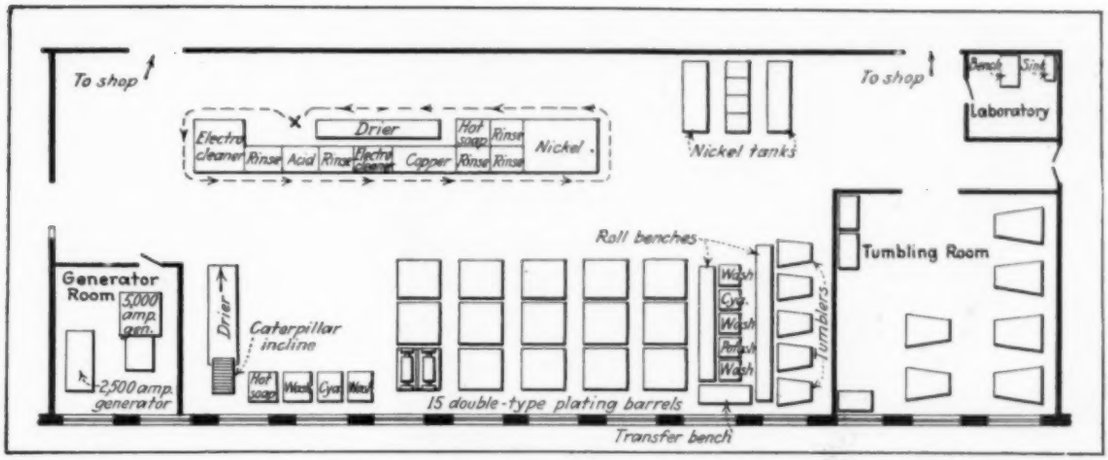



*Fig. 1—Arrangement of the plating equipment, including the mechanical and automatic units, the drying machine and the generator room*

# Cadmium and Nickel Plating of Small Parts

By Frank W. Curtis
*Western Editor, American Machinist*

PARTS required in the construction of Alemite lubricating devices manufactured by the Bassick Manufacturing Company, Chicago, Ill., are either cadmium or nickel plate depending upon their size and use. The majority of the pieces handled are screw-machine products and metal stampings made of brass and steel, that lend themselves readily to such plating operations. Gradual increases in the amount of work turned out have necessitated the addition of new equipment from time to time, so that the plating at present is handled in a separate section of the factory, centrally located and equipped with adequate facilities to take care of maximum requirements.

Layout of the department showing the arrangement

*Fig. 2—General view of the plating department showing several mechanical plating barrels at the left and the automatic conveying-type unit at the right. Five mechanical barrels handle the cadmium plating and the remainder of the equipment takes care of the nickel plating. Most of the work is either screw-machine or press products*

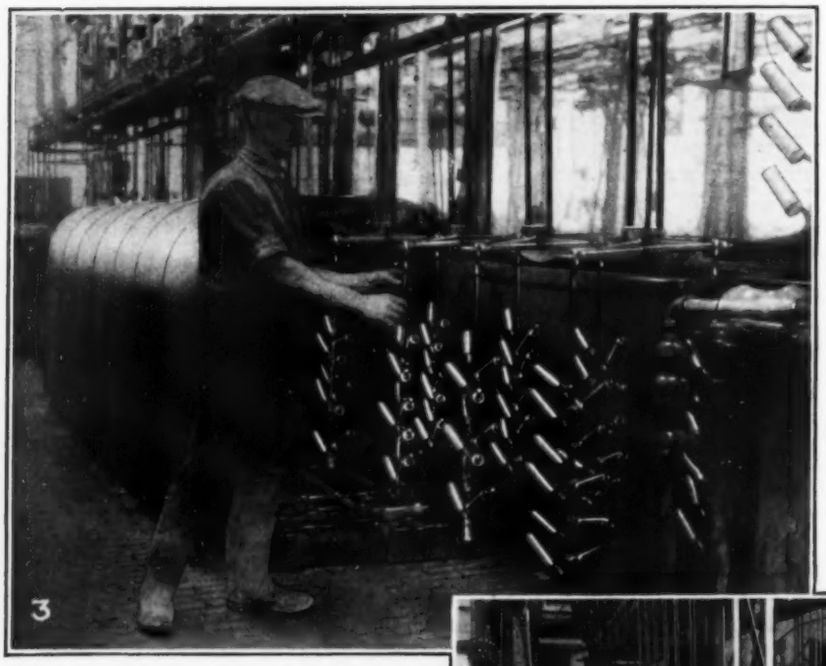
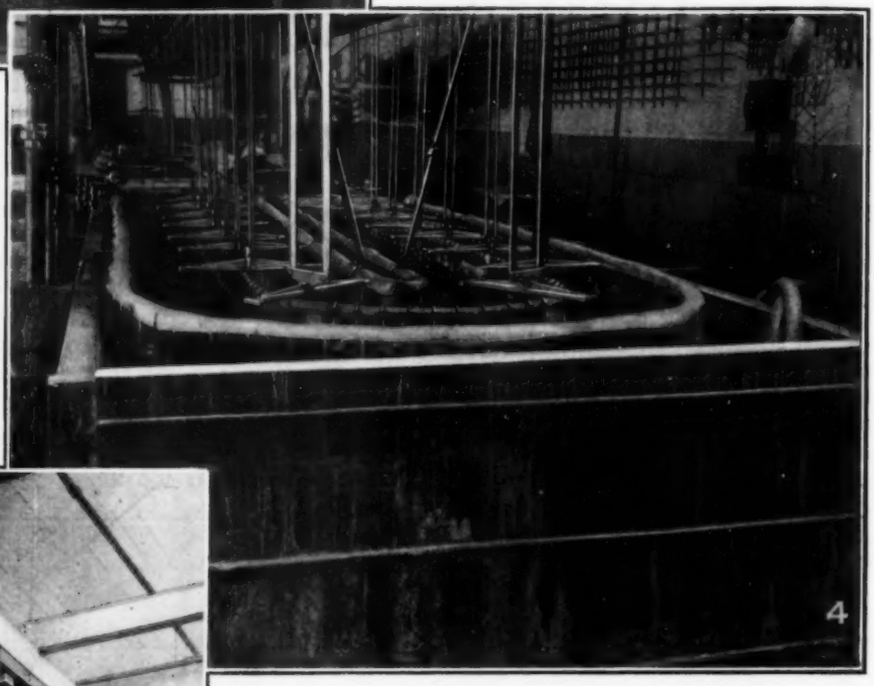


*Fig. 3—The loading station of the automatic conveyor unit. Parts to be plated are suspended by racks that accommodate between 11 and 24 pieces depending upon their size. The hooks or carrying arms, arranged to hold two racks, are attached to an overhead conveyor that is driven by an individual motor. A total of 46 hooks are used, these being operated at a speed enabling a cycle to be completed in 24-min. time*

*Fig. 4—An end view of the automatic unit showing the nickel bath and the path of the racks therein at one end of the tank. The solution is pumped through a filtering unit at the rate of 900 gal. per hr. in order to keep the solution at a proper consistency. Several racks of different sizes may be seen hanging at the right*



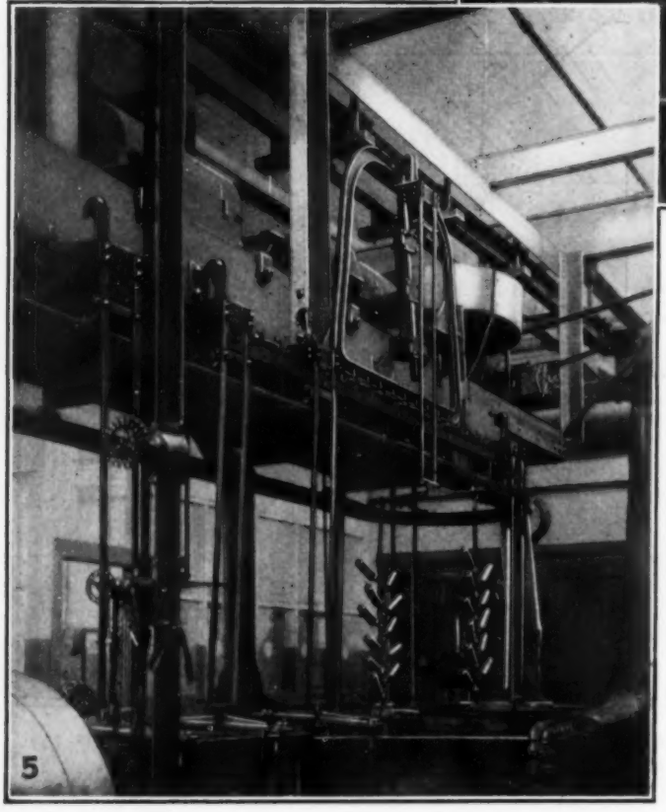


*Fig. 5—One of the overhead arms that transfers the racks from one tank to another automatically. A loaded rack is shown in the raised position. The treatment for nickel plating includes an electro cleaner, a hot-water rinse, a pickle bath, a cold-water rinse, a second electro cleaner, a copper plate, a double water rinse, a nickel bath, a cold-water rinse, a whale-oil soap bath, and a drying operation*

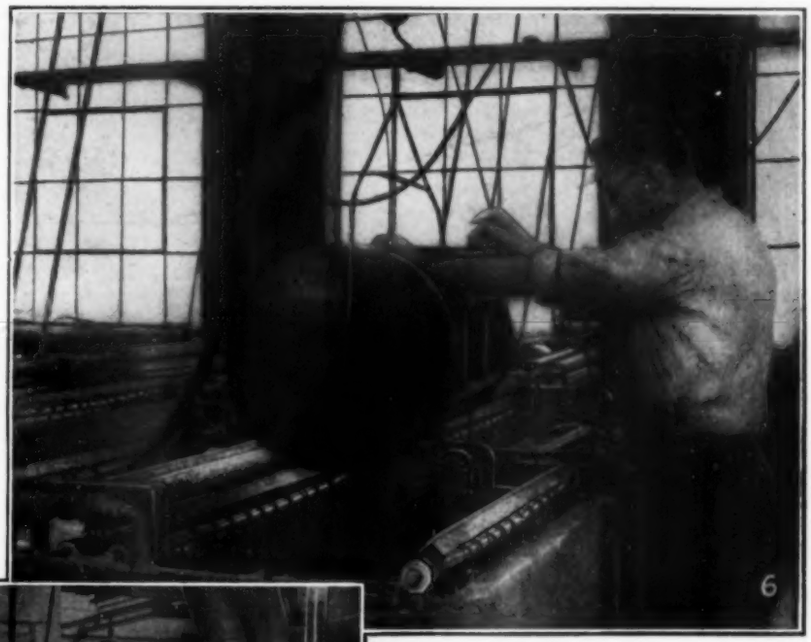


*Fig. 6 — One of the mechanical barrels used for cadmium plating. The preparation of the work prior to entering the cadmium bath is similar to that required for nickel plating. The cathode connection is passed through the barrel at the shaft bearings, and the anode connection enters the solution. All connections are taken from lines running across the tanks, thus leaving the overhead space unobstructed and enabling the use of a traveling air hoist*

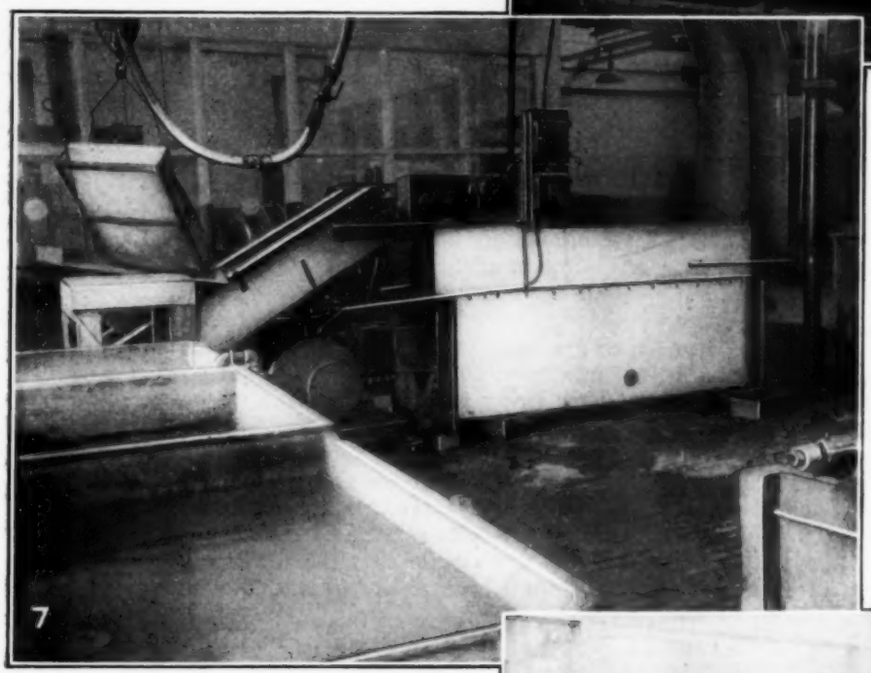
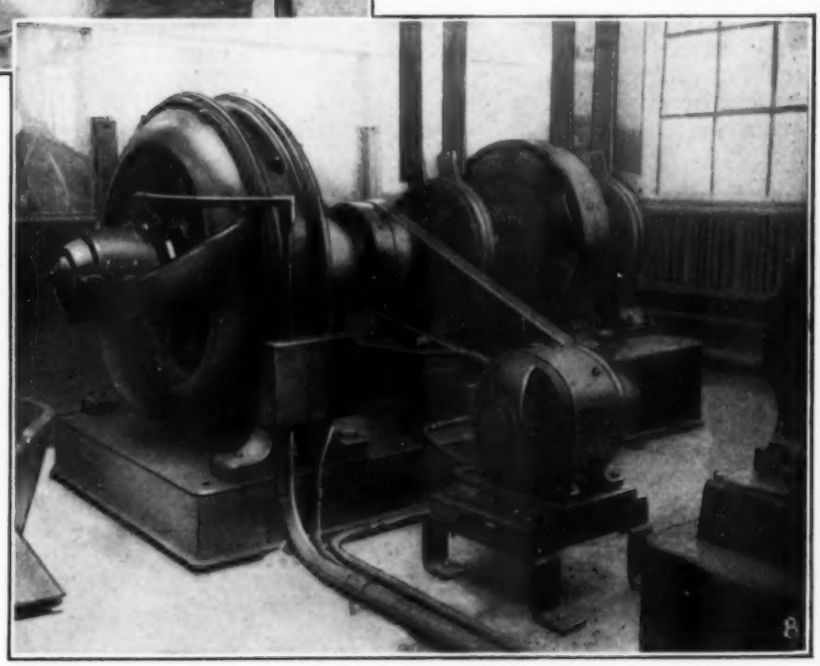


*Fig. 7 — When the work has been plated, it is transferred to washing tanks and then it is dried in the unit shown. The work is loaded on a caterpillar track located at the front end of the dryer which enables most of the water to pass off before the work enters the drying chamber. A spiral screw within the dryer transports the work to the rear end from where it drops into tote boxes*

*Fig. 8 — Two generators and their operating switches are housed in a glass-inclosed room at one corner of the department so that they are not exposed to dust. The current for the mechanical tanks is supplied by a 2,500-amp. generator, while that for the automatic conveying unit is supplied by a 5,000-amp. generator. Switches are provided to enable the generators to be used for either line in the event of a breakdown or other emergency*



of the mechanical tanks, the automatic plating unit, and the generator room together with other miscellaneous equipment is illustrated in Fig. 1. Of the fifteen double-type mechanical tanks shown at the lower central portion, five are used for cadmium plating and the balance for nickel plating. The current for these tanks is supplied by a 2,500-ampere generator. At the opposite side of the department is shown the Hanson-VanWinkle-Munning automatic-type plating unit, used for nickel finishing, which receives its current supply from a 5,000-ampere generator. In the general view of the department, Fig. 2, the boxes used for transporting the work to and from other portions of the shop are shown at the left.

Parts to be plated in the automatic unit are loaded and unloaded at the station designated *X* in Fig. 1, which is illustrated in Fig. 3, where an operator is shown removing a rack of pressed-metal bodies. Each hook accommodates two racks, containing 11 pieces. On other work the number of parts per rack varies with the size, some being arranged to hold 24 pieces. Altogether 46 hooks are provided, these being suspended from a continuous overhead conveyor driven by a 3-hp. motor and operated at a speed enabling a cycle to be completed in 24 min. The conveyor travels over several tanks, transferring the work automatically from one bath to another and finally passing it through the dryer shown at the left.

The cycle includes the following treatment: An electro cleaner, 200 deg. F., consisting of caustic soda, tri-sodium phosphate and soda ash; a hot-water rinse, 200 deg. F.; a pickle consisting of 50 per cent muriatic acid; a cold-water rinse; a second electro cleaner, 200 deg. F., slightly milder than the first; a copper plate, 175 deg. F.; a double cold-water rinse; a nickel bath; a cold-water rinse; a whale-oil soap bath, 175 deg. F.; and a gas dryer, heated to 200 deg. F. The cold-water baths are agitated by a water spray passing through a perforated outlet located at the bottom of each tank.

A view of the nickel tank showing how the work travels in the reverse direction after reaching the end of the unit is shown in Fig. 4. The solution is continuously filtered by a portable pump and filtering unit, having a capacity of 900 gal. per hr., that keeps the bath in a proper condition. One of the overhead transferring arms that raises the racks from one tank and dips them into the next is shown in Fig. 5. A loaded rack may be seen in the raised position, about to be lowered into the first electro cleaner.

The same installation can be used for cadmium plating with but few changes in the baths.

Preparation of parts for cadmium plating is handled in two ways, either by tumbling the work in the cleanin bath, or by immersing it in a still cleaning bath. With this exception the process for both classes of work is the same, each utilizing the mechanical type of plating tank. The still cleaning bath is used for parts somewhat larger than those tumbled, the practice being to place a quantity of parts in a screen mesh basket. After being cleaned, the work is rinsed, dipped in a muriatic-acid pickle bath for approximately 1 min., rinsed again, dipped in a cyanide bath for ½ min. to remove any oxide that may remain on the surface, and then thoroughly rinsed. It is then transferred to the plating cylinders of the mechanical tanks which are made of a mahogany frame and Micarta perforated panels. When a cylinder is lowered in the tanks the cathode connection is made by means of electrical connections at the shaft bearings. A cylinder of completed work being raised from a tank is illustrated in Fig. 6, which shows the general construction of the cylinder and the tank. The anode connections entering the solution, as well as the cathode wires, are taken from electric lines running across the tops of the tanks, thus leaving the space above the tanks unobstructed and providing clearance for the cylinders to be transported as desired. Overhead air hoists of the traveling type serve each row of plating tanks and the cleaning units. The cylinders are picked up by tongs that raise them by their shaft bearings.

One gallon of cadmium solution is made up of 4 oz. of cadmium oxide, 8 oz. of sodium cyanide, 1 oz. of caustic soda and the balance water. The plating is done at room temperature at 6 volts, utilizing 100 amp. hr. per cylinder. The cylinders rotate at 4 r.p.m. and the work is left in the bath for approximately 45 min. Salt-spray tests are made of the finished work at intervals to check the efficiency of the solution.

After being plated the work is washed, dipped in a whale-oil soap bath, rewashed, and dried in the machine illustrated in Fig. 7. A motor-driven link-section track has been installed at the front end of the dryer shown at the left, to permit most of the water to flow off the work before the parts enter the drying chamber. A spiral screw transports the work to the rear of the unit from where it drops into tote boxes ready for delivery to the shop.

A view of the 5,000-amp. generating unit is shown in Fig. 8. The smaller unit, somewhat similar but not shown, lies to the right. This equipment, including the operating switches, is housed in a separate section of the department so that it is not exposed to dust.

## *Autumn Is Convention Time*

**Autumn is Convention Time, when good minds get together and make progress toward solving the industries' problems.**

**Very few individuals can give the right amount of attention to their jobs and at the same time attend all of the conventions that mean something to them.**

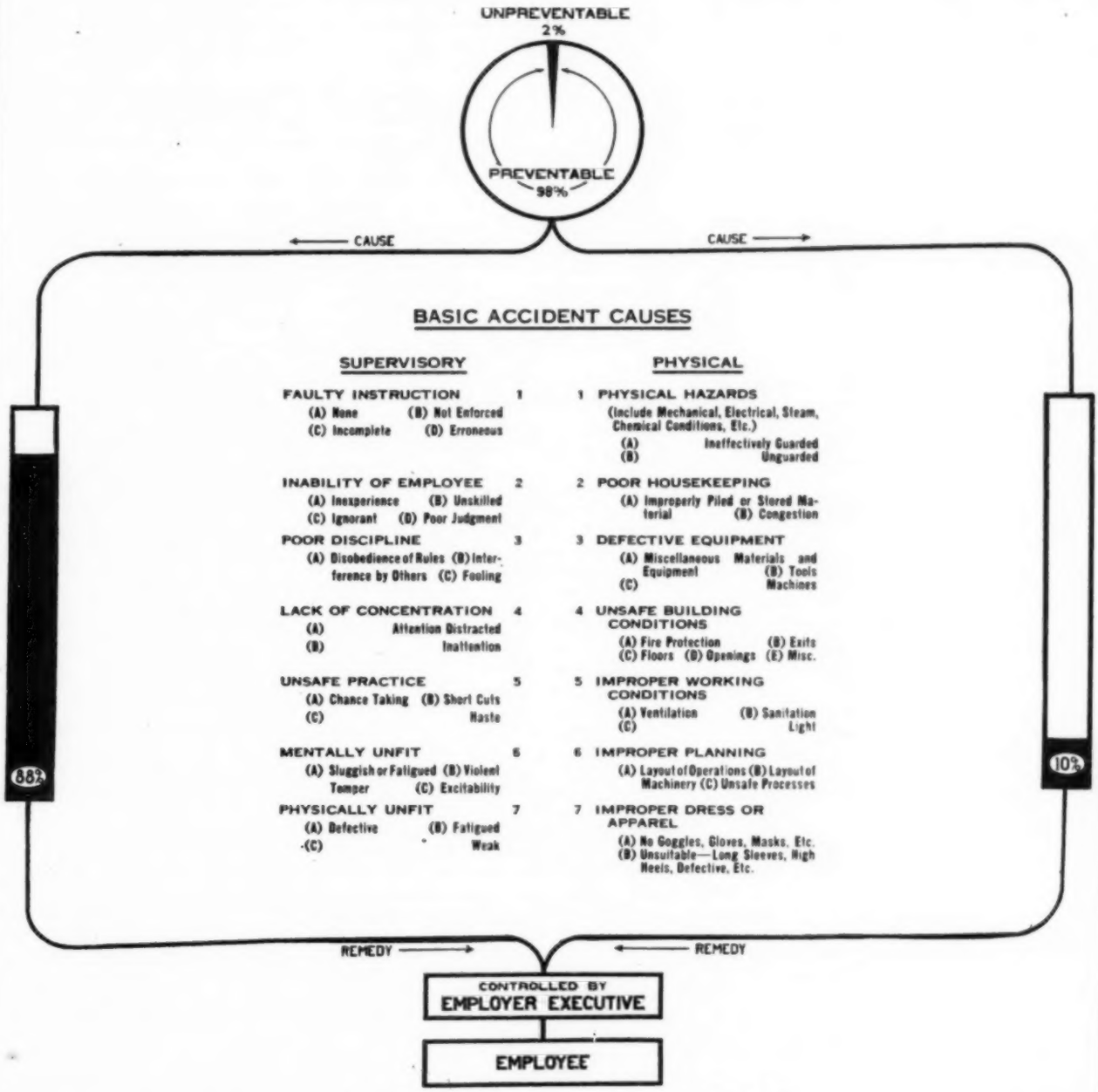
**No individual should stay away from all conventions; when he goes he profits from his contracts, from his change of work, and from the papers presented. For reports of those conventions that he is forced to forego he should depend upon his industry publication.**

**During the next four months the *American Machinist* will report many worthwhile conventions and meetings having the importance of conventions. Among them will be the annual meeting of the Railway Tool Foreman's Association, the Cincinnati national meeting of the Machine Shop Practice Division of the A.S.M.E., the Philadelphia meeting of the A.S.S.T., the Buffalo meeting of the A.G.M.A., and the annual meeting of the A.S.M.E.**

# Industrial Accident Cause Analysis

## *Check Your Plant Against this Chart*

Through the analysis of 75,000 accident cases, of which 63,000 were taken from the records of plant owners and 12,000 from the claim-files of an insurance company, it was found that 98 per cent of industrial accidents are preventable. The accompanying chart shows the causes of these accidents. It can be seen that 88 per cent were due to "supervisory" faults, including inattention and unfitness on the part of the workman, which in turn could be avoided by closer supervision by the foreman and junior executives. Defective equipment and physical hazards cause many accidents, but in the main, lack of attention and supervision make the heavy toll of all shop accidents most of which can be readily prevented.




Courtesy of The Travelers Insurance Company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# · TECHNICAL · ABSTRACTS ·

### Heat-Treatment of Aluminum and Its Light Alloys

The primary object of the quenching and aging heat-treatment of aluminum alloys is to confer enhanced mechanical properties. Thus the Brinell hardness of pure aluminum is about 15, while heat-treated aluminum alloy castings are produced having a hardness of over 150. The tensile strength of ordinary rolled and annealed commercial aluminum is about 12,000 lb. per sq.in. Wrought alloys are made having strength in the range 34,000 to over 80,000 lb. with elongation of 10 to 30 per cent. Wrought and heat-treated duralumin has tensile strengths of 60,000 to 65,000 lb., with elongation of 18 to 20 per cent. Higher mechanical values can be developed in wrought material than in cast aluminum alloys. The range obtainable is about 30,000 to 50,000 lb. with 1 to 10 per cent elongation for cast alloys, in a heat-treated condition. Without this treatment, the strength is usually only about 20,000 lb. per sq.in., and the elongation about 1 per cent in 2 inches.

In annealing wrought aluminum parts, the chief defect which may arise due to too high annealing temperature is blistering. This tendency increases with increasing temperature of annealing. Aluminum alloys are hot short, and at the quenching temperature, parts may be distorted by their own weight or the weight of other parts in the load. In the quenching operation, the pieces must be transferred from the furnace to the quenching bath without undue bumping or jarring. Quenching in ice water is prone to cause cracking, while quenching in boiling water causes less strain than cold water. All the defects are more numerous the higher the quenching temperature. — Robert J. Anderson, *Fuels and Furnaces,* August.

### Wear Testing of Steels

A knowledge of the resistance of metals to abrasion under so-called "wet-grinding" conditions is necessary for the intelligent specification of steels used in the handling of moist abrasives. In order to obtain such knowledge, a machine was developed consisting of a very accurately controlled grinding machine in which all conditions as to abrasive, speed, time and moisture or other liquid content are under the control of the operator. The idea behind the work was to approximate any given set of field requirements. The wear is measured by the amount of metal worn off in approximately 15,000 ft. of travel at a speed of 125 ft. per min., using a pressure of 50 lb. per sq.in., and a testing face of approximately 3 sq.in. It is expressed as the ratio of wear loss as compared with a standard (commercially pure iron) at 100. Of particular interest is the fact that by varying the abrasive used, it was possible to develop alloys specifically adapted to particular field requirements.

The abrasive constituent of most non-metallic materials encountered under field conditions is quartz in some form or other. Other materials are, of course, met with also, but these are all softer and are supposed to be less abrasive than quartz. In most of the tests, therefore, the relative abrasive resistance of new steels and alloys was determined with a standard controlled grade of silica sand as the abrasive. The following table gives the ratio of the abrasive resistance against sand of various alloys to commercially pure iron.

| | |
|---|---|
| Standard specimen (commercially pure iron) | 100 |
| Merchant bar iron, annealed | 92 |
| Manganese steel | 77 |
| Tool steel, hardened | 72 |
| Stellite (welded wearing face) | 51 |
| Amsco Alloy No. 459 (welded wearing face) | 31 |
| Amsco Alloy No. 459 (as cast) | 10 |

The Amsco Alloy No. 459 is an alloy containing approximately 3.5 per cent of carbon and 15 per cent of tungsten group metals to which varying amounts of nickel and other toughening constituents may be added.—J. M. Blake, *Proceedings* of the American Society for Testing Materials, Vol. 28, Part II, 1928.

### Properties of Common Stainless Steels

Waste and monetary loss from corrosion has been estimated at $2,500,000,000 per year. In an effort to decrease this waste, the consumption of stainless steel has increased 600 per cent in the last three years. Stainless steels are of two types: the first, containing 0.30 per cent carbon and from 12 to 14 per cent chromium, is known commercially as stainless steel, while the second, which contains 0.12 per cent carbon and from 12 to 14 per cent chromium, is known commercially as stainless iron. The stainless steel has a tensile strength of 260,000 lb. per sq.in., elastic limit of 225,000 lb. per sq.in., elongation in 2 in. of 11 per cent, reduction of area of 32 per cent, and a Brinell hardness of 512. On the other hand, stainless iron has a tensile strength of approximately 80,000 lb. per sq.in., and an elastic limit which is somewhat higher than that for mild carbon steel. Both will effectively defy corrosion when subjected to moist air, water, perspiration, blood, nitric and nitrous acids, vegetable and mineral oils, mine water, alcohol, ammonia and other alkaline solutions, gasoline, soap, mercury, and many other organic and inorganic chemicals. However, they will not resist the action of hydrochloric, hydrofluoric, sulphuric and sulphurous acids.

Stainless steel can be forged and welded. The technique of forging and the subsequent heat-treatment vary for each desired result, and must be worked out by each manufacturer. Welding can be accomplished with care and special attention to prevent oxidation. It is entirely practical to weld this type of stainless steel to ordinary carbon steel. Brazing and soldering may also be done with care.

Stainless steels and irons are used for a wide variety of products. Among the principal uses of stainless steel are: cutlery, gun barrels, automobile parts, chemical equipment, and dairy equipment. It is now being produced by 26 licensed mills. It is available in most commercial forms such as hot-rolled bars, plates, shapes, sheets, cold-drawn bars, hot-and cold-rolled strip, and tubes. As the coefficient of expansion of stainless iron is lower than that of ordinary steel, it is suitable for the working parts of machinery subject to heat.

One of the remarkable physical characteristics of stainless iron is the fact that it retains to a marked degree its high physical properties at elevated temperatures, thus making this material particularly serviceable in many industrial applications where tensile strength at high temperatures is essential. The extreme toughness of the material makes it valuable where high torsional strength is required.

Stainless iron can be welded only by the electric or gas processes provided certain precautions are taken. The weld must be protected from the air to prevent oxidation. This can be done, but it requires care and the development of a special technique on the part of the operator. Welding rods of the same composition as the metal being welded should be used. Since stainless iron will air harden, it is necessary to anneal the weld in order to restore its softness. For large work, the weld alone may be reheated to a dark cherry red and allowed to cool in the air. Brazing of stainless iron is readily accomplished with tobin bronze by means of suitable brazing flux. This work should be done at a temperature at which the bronze flows sluggishly. Spot welding requires no special precautions.

Because of its toughness, stainless iron machines more slowly than ordinary steel, and speeds and tools must be adjusted accordingly. When making pressed steel products, the toughness and high physical properties require adjustments to be made in the pressures and die clearances. Heavy scale is not formed on this material when it is subjected to high temperatures. Its melting point is approximately 2,700 deg. F., considering the melting point as the temperature at which the liquid metal first begins to solidify.—J. C. C. Holding, *Iron Trade Review,* August 16.

# IDEAS · FROM · PRACTICAL · MEN

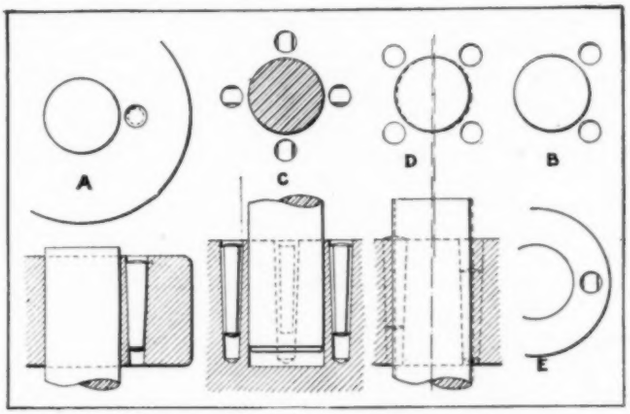
*The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit*

## Varying the Diameters of Holes by Taper Pins

By Henry Simon
*Jena, Germany*

A way to vary the diameters of "solid" holes is shown in the illustration. This method is somewhat analogous to the expansible threads described by me in a former issue, taper pins also being used in this instance to effect the variation.

The conclusion might be jumped at by a garage mechanic that this method would be fine for hammering a botched-up job to size again, and it is, indeed, possible




*Various applications of the method*

in an emergency to tighten a sloppy hole in this manner. The proper use of the method is quite the opposite, however, on accurate work where it is intended to vary an already close fit, or to lock a snugly fitting part frictionally when other means would be impracticable.

This method of varying the size of a hole can be applied wherever a sufficient thickness of metal remains back of the pin, as at *A*, so that the displacement will be toward the hole. Where the fit between the parts is very close, a single pin will usually be sufficient. A firmer and better hold can be obtained by having two pins 90 deg. apart, as at *B*, then giving a three-line hold. The arrangement at *C* is for cases where it is desired to maintain the internal piece strictly in the center of the hole. The same arrangement can be used, as at *D*, to shift the internal piece eccentrically by extremely small amounts, by removing some of the pins.

This scheme can be applied also to hardened parts, provided the original fit is very close. Where more than two holes are used, it will usually be well to flatten the pins slightly on opposite sides as at *C*, so as to prevent circumferential strains. Such strains might have a tendency to offset the desired effect by causing a spreading action along the periphery of the external part, unless very considerable metal were back of the pins. In fact, it is sometimes possible to enlarge a hole with a taper pin used as at *E*, where but a moderate amount of metal is around the hole. Where the holes are blind, the ends of the pins should be kept above the bottoms of the holes, so as to prevent the resistance that the solid bottoms would offer to their action.

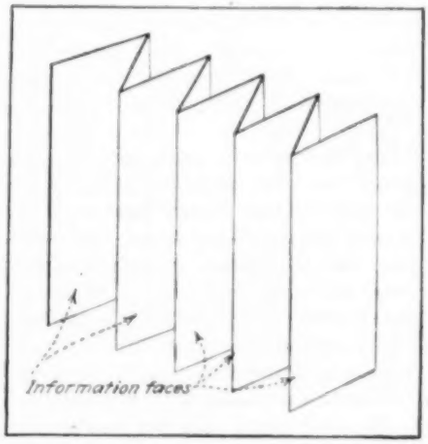
Some of the applications of this method to locking, are where there are no opportunities to apply lock screws, or to split the exterior part. Also where it is essential that the walls of the holes remain unbroken, and where it would be difficult or inconvenient to have the locking action from the side, as where the face only of the part is readily accessible.

Uses for varying the size for purposes other than locking, are to obtain and maintain an exact fit; to correct slight errors in making the parts, and particularly to forestall trouble from such errors by making provision for the pins in the design; and to compensate for the effects of wear. A slightly greater contraction takes place nearest the large ends of the pins. This circumstance may be taken advantage of to make up for the additional wear caused by the frequent insertion of the internal part from one side.

## Folding Blueprints

By Phil Schvon

All draftsmen and shopmen handling blueprints of 5 ft. or over in length, realize how combersome the prints are to handle to get at some particular detail, if the blueprints are rolled. This is especially true when a mechanic is given a rolled blueprint several feet in length, and he is concerned only with a detail near the middle. This trouble may be overcome if, when the blueprints are made, they are folded in the manner shown in the sketch. The blueprint is folded accordion style, the folds being 12 in. wide, with the faces containing the working infor-




*Blueprint folded for easy reference*

mation facing each other. In this manner, if one is working to any particular detail on that print, he simply opens to the fold containing the information. Thus but two feet of the print is spread on the table. With prints folded in this manner they can be handled as easily as turning the pages of a book.

## A Simple Set-Up for Testing the Accuracy of a Square—*Discussion*

By Jos. E. Abbazia

In discussing the article under the title given above, by James McIntyre, on page 32, Vol. 69, of the *American Machinist*, I would like to submit the following:

While the method described by Mr. McIntyre may be all right, I do not understand how light can be seen between the edge of the square blade and the parallels when there is a solid wall of iron behind them.

In testing a square by Mr. McIntyre's device, there are four chances that the parallels will not be adjusted correctly, thus contributing to the inaccuracy of the test.

An accurately-ground cylinder, slightly concaved on the ends and stood on a surface plate, makes an excellent test block for the outside of a square. The inside of the square can be tested by this same cylinder, providing its diameter is not greater than the inside length of the stock of the square.

## An Indexing Tapping Fixture

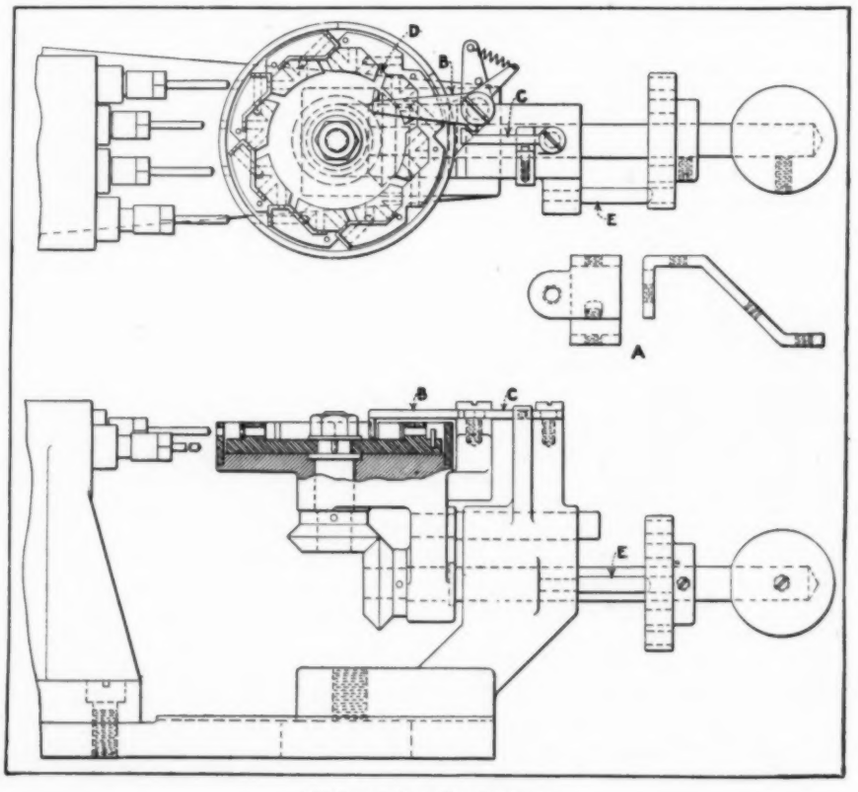
By J. E. Fenno

The fixture illustrated was designed for tapping four holes in the piece shown enlarged at *A*. Four taps are held in a multi-spindle head attached to an ordinary horizontal tapping machine. The work-holding turret is provided with eight stations so located that one of the holes, will be tapped in each of the four pieces at each forward movement. By this arrangement, the tapping of all four holes will be completed in one piece at each indexing after the first cycle.

In operation, with the turret at the rear position, a piece is dropped into the loading station. The turret is then indexed to bring the piece in line with the first tap, and is pushed forward by the ball knob at the right. When the tap has passed through the work, the turret is drawn back and indexed, and another piece is dropped into the loading station. When the turret is again pushed forward, the first piece is in position for tapping the second hole and the second piece is in position for tapping the first hole. The operation is repeated, the first piece being completed after the fourth indexing. This completes the cycle, after which a piece is completed at each indexing.

After all the holes have been tapped in the first piece and the turret has been indexed twice, the last piece tapped is brought opposite an opening in the guard surrounding the turret. At this point, as the turret is drawn back, the lug on finger *B* contacts with the end of the pawl *C*. This causes the bent end of the finger to enter one of the eight slots *D* in the turret, and eject the piece through an opening in the guard surrounding the turret, after which a completed piece is ejected at each indexing.

The indexing mechanism is very simple. A collar having eight holes is attached to the push rod, the index pin *E* being held in a stationary part of the fixture. When the turret is drawn back far enough to clear the taps, the pin is out of engagement with the holes in the collar. The turret is then indexed by turning the ball knob in the proper direction until the next hole in the collar is in line with the pin. The turret can then be moved forward having been advanced one station.



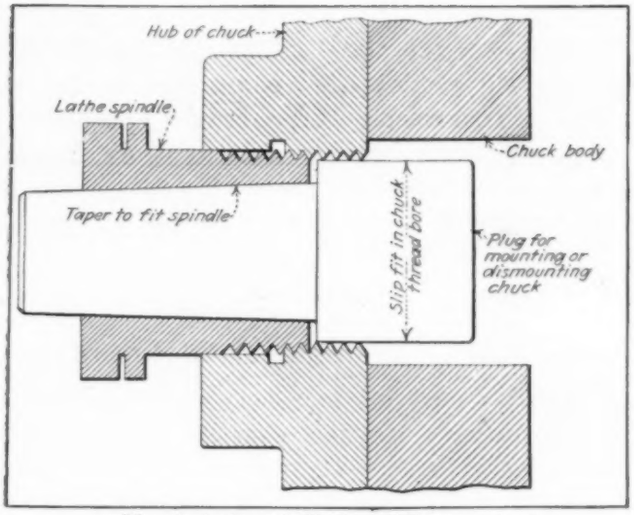

*Indexing tapping fixture*

## Taper Plug for Handling Heavy Chucks

By H. L. Wheeler

The mounting or removal of chucks and face plates on large lathes may be greatly facilitated by the use of a plug turned to fit the taper hole in the spindle and having a straight portion which fits the threaded hole in the chuck. By the use of this simple device the thread will always start easily and all tendency of the heavy chuck to cramp or bind is avoided, as the chuck is centered immediately with relation to the thread on the spindle.

The chuck can be screwed off or on and allowed to rest on the plug while waiting for a crane or a helper to lift the chuck from the lathe. This plug is also a safety device, as frequently a man is injured in the work of mounting or removing a big chuck. The plug may be




*Plug in lathe spindle for sliding on chuck*

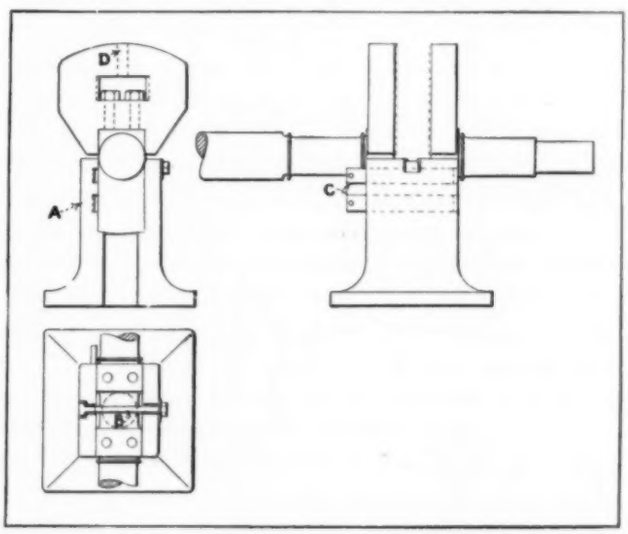
turned from machine or tool steel and kept with the lathe at all times as a part of the equipment. Its time and labor saving features will soon pay for the cost of making it. In shops where there are several lathes of the same size and make, one plug would do for all of them.

## Assembling Crankshafts and Counterweights

By H. W. Los
*Epe, Holland*

Where a considerable number of crankshafts for a heavy type of internal combustion engine had to be turned out, we made the clamping fixture shown in the accompanying illustration for driving the counterweights onto the shafts.

The shaft is lowered into the cast-iron fixture *A*, and supported by the traveling crane until bolt *B* is inserted and the nut tightened up, so that the shaft remains in the required position. Then the crane hook is released and the keys *C* driven into the keyways, in order to clamp the shaft securely between the webs of the fixture. The annealed studs are inserted into the crank webs with a sledge until the nuts can be tightened to the limit. A feeler is applied in order to make sure that no play will exist between the jointed surfaces of shafts and counterweights.




*Fixture for assembling counter-weights and shafts*

The holes in the rough cast weights are drilled a bit large, so that the weights, if correctly placed, do not project beyond the outer sides of the crank webs. This is done in order to eliminate the chance that the shaft cannot be lowered into the engine frame, due to a weight not being in line with the crank webs and touching the main bearings.

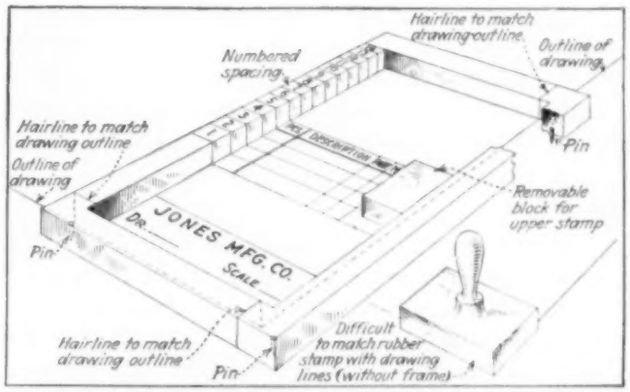
It does not matter if the weights project a few sixteenths of an inch beyond the inner sides of the webs, because there will be some play between the counterweights and the connecting rod. This possibility is indicated by the dotted lines. After inspection, the rectangular holes in the weights are inclosed by pieces of board, and filled up with lead through the holes *D*, in order to prevent the nuts from working loose.

## Rubber Stamp Frame for Drawings and Tracings

By W. King

Where tracing cloth and paper are not already printed with the firm name and bill of material table, the use of a rubber stamp presents difficulties for quick and accurate placing of the stamp. To facilitate this operation we devised a frame, shown herewith, with a hairline at three corners to match the corner outlines of the drawing. To hold the frame rigid, once placed, three sharpened pins are provided on the under side and project $\frac{1}{32}$ in. below the frame. The outside edges of the stamp fit snugly into the frame and the impression is made instantly and accurately in place.

The sides of the frame are lined for "bill of material" table spacing, and these spaces are stepped off by means




*Rubber stamp frame for marking drawings*

of a pencil point; the line is drawn across when the frame is removed. These spaces are numbered so that the required number of spaces can be marked off instantly. The frame can be raised and reset, depending on the height of table required.

A second rubber stamp, for "bill of material" heading, such as "pcs.," "description," etc., in the vertical spaces, can also be placed quickly by being set against a removable block, which moves up or down and fits the inside of the frame in the same manner as the rubber stamp. Short dashes projecting from the top line of the large stamp will indicate the vertical spacing.

American Machinist

*Editors:* KENNETH H. CONDIT AND FRED H. COLVIN

Established 1877

## *An Inventory of Methods*

PHYSICAL inventories of manufacturing plants are the regular practice in the majority of companies, and are even found necessary occasionally in organizations with well developed continuous inventories. Even the least efficient manager has a fairly clear picture of what it costs him to lose copper, or steel, or tools. What he often fails to visualize is the loss arising from obsolete methods and the retention of antique equipment.

As competition becomes steadily sharper, both at home and abroad, the difference between profitable operation and elimination from the field may well be determined by the degree of progressiveness reached by the management. Obviously, therefore, some sort of periodic inventory of methods, and of the efficiency of executives perhaps, is quite as essential as an inventory of raw materials, parts and finished product.

A good many of us find it much easier to accept things as they are, to continue methods that have been successful in the past because it is simpler to continue than to change. We may know perfectly well that something is wrong in Department Q and yet lack the moral stamina to undertake the general house cleaning needed to rectify matters. Such an attitude is certainly dangerous and may be fatal.

There are two ways to go at the trouble. It may be studied from the inside if the company is fortunate enough to command the services of an engineer or executive sufficiently flexible to be able to forget details and daily routine and go after the seat of the trouble with an entirely open mind. Such men are rare, and extremely valuable.

The other recourse is to engage a firm of consulting engineers that has specialized in work of this sort. When a representative of such a firm comes in he looks at things with the unbiased eye of the outsider. It is nothing to him that the superintendent of the pressed metal department once saved the company a lot of money by a clever piece of work. He looks at what that man is doing now, and, if he finds him resting peacefully on his laurels, has no hesitancy in saying so.

It may well be that a combination of the two plans will yield better results than either one alone. That cannot be predicted. The point is that something should be done to assure the general management that progress has not ceased and that the methods in vogue are at least as good as those of any competitor.

## *Political and Commercial Accord*

A FEW days ago there was signed in Paris a treaty that bids fair to mark another forward step in the direction of world peace. As a guaranty against aggression it is probably no more potent than previous treaties. Agreements have been, and can be, disregarded under exceptional circumstances.

What counts is the national spirit behind each signer. If that spirit is single-mindedly devoted to peaceful accord with international neighbors, and remains steadfast in that devotion, then indeed have we made a real advance.

In commercial relations, as well, is there a need for international understanding. Much has been accomplished already through the exchange of visits by individuals. In Germany particularly there is a keen desire to be friendly and American visitors are shown every courtesy. The Germans are also most appreciative of the courtesy shown them on visits to American plants. Thus the foundations are laid for a commercial accord that should be fostered, because Germany is unquestionably our most important competitor in large scale production.

Just at present those engaged in mass production in Germany are struggling with some of the problems that beset our own pioneers in this type of manufacturing. Most of their products are not to be feared, as yet, although they certainly demand respect.

What the future holds in the way of competition for our manufactured products no one can say, but it is only reasonable to assume that manufacturers in other countries will improve their methods and their products until they are better than they are now. Our task is to keep improving our own products, methods of manufacture, and equipment, and thus to hold our lead.

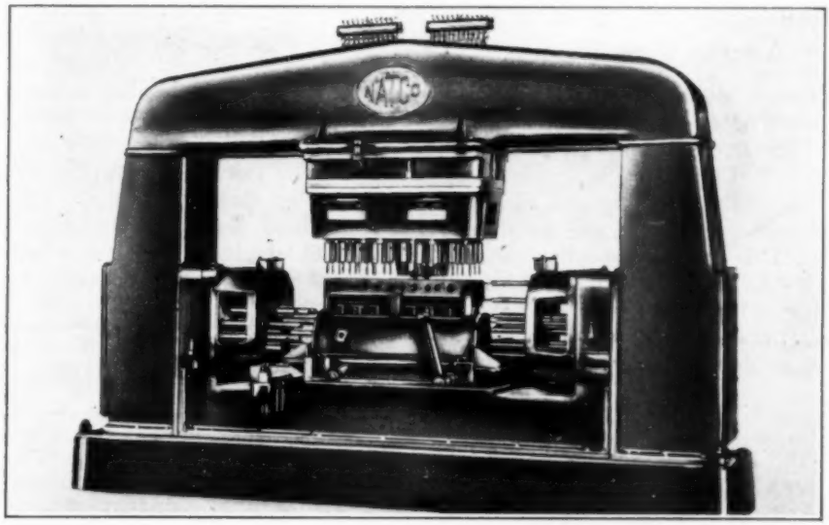
In this precaution we should make every endeavor to treat foreign competitors with the respect that is shown for each other by the highest type of American manufacturers. Individually, a start has been made. It should be continued and extended until its scope is national.

# · SHOP · EQUIPMENT · NEWS ·

## Natco Special 3-Way Lead Screw Tapper

ALL holes in three surfaces of cylinder blocks can be tapped in one operation on this special machine, which has been developed by the National Automatic Tool Company, Richmond, Ind. A total of 61 holes are tapped—30 on the top, 22 in the front, and 9 in the rear end. Production is quoted at 60 blocks per hour.

Each tap on this machine has an individual lead screw. Both the vertical head and the two horizontal heads are driven by the main reversing box in the rear, which is, in turn, driven by a 30-hp. constant-speed motor. The operator starts the machine by pulling the handle of the air valve. This starts the right-hand rotation of the spindles and when the proper depth is reached, they are reversed automatically. The spindles stop when the taps are withdrawn, completely from the work. By pushing the handle of the air valve, the operator can reverse the machine.




*Natco Special 3-Way Lead Screw Tapper*

## Sentry Model L Industrial Electric Pot Furnace

For industrial production heat-treating in lead, salt and cyanide up to 1,600 deg. F., and for melting soft metals, this Model L electric pot furnace has been placed on the market by the Sentry Company, Taunton, Mass. It is manufactured in three sizes having ratings of 16, 25, and 35 kw. at 220 volts. The depths of the pots of the three sizes are 16, 18, and 20 in. measured from the lips and the widths of the tops are 9, 13, and 17 in. for alloy steel pots. The furnace is completely inclosed in a metal case, as shown in Fig. 1, and has two semicircular cover sections hinged to the top plate on separate axes by ball-and-socket joints. The sections are dovetailed along the center line to reduce heat loss in the closed position. When open, the covers swing clear of the pot, and rest on fins which prevent direct transmission of heat which might warp the top plate. The furnace casing is of heavy steel plate, clamped between top and bottom cast-iron plates carried by pipe uprights.

Either alloy or steel pots may be suspended in the furnace cavity shown in Fig. 2. The heating element consists of heavy, Nichrome ribbon heating units wound in a double helix, the outer and inner coils being staggered, thus giving the effect of a solid wall. These heating elements are carried on refractory blocks which dovetail into the furnace wall in such a way that the heating elements can be disassembled easily. Furnace insulation is 9 in. thick.

*Fig. 1—Sentry Model L Electric Pot Furnace*

An alloy drain tube located in the center of the refractory catch basin is arranged so that any leakage which may occur from the pot will be poured over the lip and down the center of the tube. This drain tube extends to the bottom of the furnace, and by heat conduction maintains a temperature that will not permit the leakage to chill, thereby preventing accumulation in the drain.

Automatic control equipment for the Model L furnace consists of an indicating or recording compensating control pyrometer complete with all necessary attachments, including

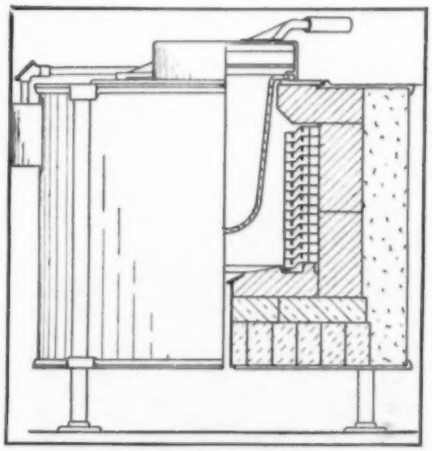


*Fig. 2—Cross-section of the Sentry Model L Industrial Electric Pot Furnace*

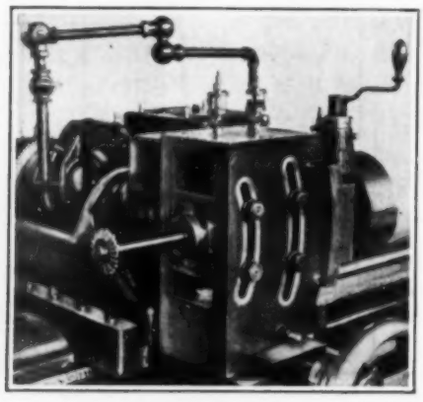
Chromel-Alumel thermocouple, nickel or alloy protection tube, relay and magnetic contactor of sufficient ampere capacity to match the furnace rating. A panel for mounting the various instruments and switches can be furnished.

## Internal Milling Head for Pratt & Whitney Model "B" Thread Millers

This milling head, designed for internal milling and hobbing, has been developed by the Pratt & Whitney Company, Division of the Niles-Bement-Pond Company, Hartford, Conn. Application of this head to either the Model "B" 6- or 10-in. thread millers converts them into universal machines, as the regular cutter head will handle all external milling and hobbing, and this head will complete all internal work. The head is so geared that the speed of the external cutter spindle is practically double that of the internal cutter spindle, because small milling cutters can be used on almost all internal work.

Sturdy construction is a feature of the internal head. As shown in the illustration, the base dovetails on to the cross-slide with the external cutter head. It is locked in position on the cross-slide by means of a lock bolt equipped with check nuts. This arrangement permits the use of the cross-slide handwheel for the transverse movement of the external and internal heads simultaneously.

Power is supplied to the internal head by a gear mounted on the cutter spindle of the external head, through two intermediate gears. The gears in this drive are Maag cut to insure smooth running action. Sight-feed oilers provide continuous lubrication to the gears. The spindle of the internal head is mounted in bronze bearings, and is equipped with a flywheel.



*Internal Milling Head for Pratt & Whitney Model "B" Thread Millers*

An adjustment is provided for setting the cutter at any angle up to 10 deg. above or below the center line. Graduations are provided on the side of the milling head for this purpose. Sturdy tierods are used for holding the cutter arbor at any given angle within the range of the milling head. The angular movement is of value when milling either right- or left-hand threads.

## "Connecticut" Universal Angle Vise Plate

Either a slotted table or a vise can be fastened to this vise plate which has been developed by N. W. Ordway, 69 Congress St., Hartford, Conn. Both the table and vise are graduated to 360 deg., and the movement of the vise plate, when rotated about the center line, can be measured through 180 deg. As shown in Fig. 1, stops are provided so that a piece in the vise may be ground on one face, and then the vise plate rotated through 90 deg. and the piece ground on another face. Many pieces, difficult to machine, can be attached to the table shown in Fig. 2, and milled or ground to any desired angle. With verniers applied to the table, measurements to within 5 min. of arc can be made. The keys in the base run parallel with the center of fixture. When the vise jaws lie in the vertical plane, the clearance under them is 1½ inches.

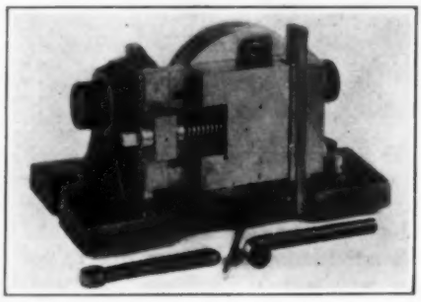


*Fig. 1—"Connecticut" Universal Angle Vise Plate equipped with vise and stops*

The vise and table are interchangeable. The same two hexagon nuts are used to hold both the table and the vise, and they both revolve on studs in the center. Two sizes of this device are available. The first has a base 4½ x 7½ in., and carries a table 3¼ in. in diam., having a height of 4½ in. The T-slots are ¼ in. in width. The second size has a base 6½ x 9 in., and carries a 4½-in. table, having a height of 5 1⅜ in., and $\frac{5}{16}$-in. T-slots. The vise, which can be applied to either size, opens 1⅜ in., and has a depth of ⅝ in. and a width of 3 in. The weights of the two sizes are 16 and 28 lb., respectively.

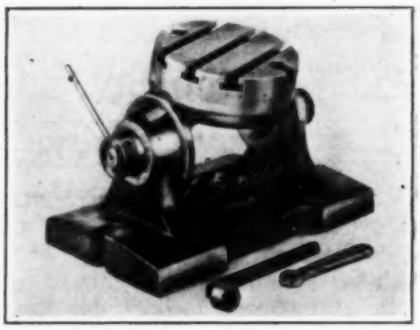


*Fig. 2—"Connecticut" Universal Angle Vise Plate equipped with slotted table*

## Trade Catalogs

BORING AND MILLING MACHINE. The Universal Boring Machine Co., Hudson, Mass., has published a catalog covering the "Tri-Way" boring and milling machine. The construction details of the No. 24 "Tri-Way" are furnished, together with photographs of the various assemblies. Standard specifications, including a table of the spindle speeds and feeds in inches per min., are given. The catalog contains eleven 10½x8-in. pages.

WIRE SCREENS. The Ludlow-Saylor Wire Co., St. Louis, Mo., has published a handsomely printed and bound volume entitled "Getting Results with Ludlow-Taylor Screens." This book, which is known as Catalog No. 48, has seven sections devoted respectively to: Controlling crusher wastes with woven screens; points to consider in choice of sizing screens; reducing costs of crushing and grinding with "Red-Tang" woven screens; complete reference data on double-crimped wire cloth and woven screens, special wire cloths for all unusual services; backing up the machinery maker and distributor, and appendix. Each type of screen or cloth is illustrated, and tables show the meshes. The book contains 190 10½x8 in. pages.

# NEWS OF THE WEEK

## French Prospects Believed to Be Leading to Early Industrial Prosperity

*Automobile industry undergoing a modernization campaign*

By Our Paris Correspondent

IF THE dullness of the summer season has brought little but optimistic anticipation, it is true that with the stabilization of the franc, France is once more free to enter into long-term contracts and operations, both with respect to the import of raw materials, production tools and machinery and the consequent increase of output for distribution both at home and abroad.

Foreign trade balances for the first six months of the year showed a falling off of nearly a billion francs in value, so far as imports were concerned, but exports actually increased a billion and a half. Imports from the United States fell off, as did those from Great Britain and Germany. Exports decreased to the United States to the value of a quarter of a billion francs and there was a falling off to Great Britain as well, while they increased slightly to Germany. There was, however, a falling off again in French total exports for the month of July, amounting to three hundred million francs as compared with the same month last year, while imports were practically stationary.

### Automotive Activity

The automobile industry especially has plans and projects for future output that are still calling for machinery equipment in addition to that already ordered, if not installed, during the past months in an effort to meet the competition of imported American automobiles. This effort, it is bound to be said, is not altogether futile, considering that the American product sells for as high prices as it does as compared with the price in the United States. Here, at least, the French are seeing the benefits of an "enraged protectionism" though it will be difficult to exceed in quality as compared with the American car in certain lines. With the Citroen six-cylinder car to be put upon the market next year and the miniature Rosengart-Austin which is to enter the French market, two classes of buyers will be catered to so that the American manufacturer will have difficulty in competing, particularly since both these concerns have plants which in layout and method are a near approach to what is considered standard and normal in America. This suggests improvement in methods and machinery equipment and will naturally bring in its train still further installations of a similar nature among other makers when they find that they will simply have to adopt high unit output and multiple machinery to replace older, less efficient equipment or continue to work under severe handicaps.

An industrial activity is reported from the northern departments where there are located some important machinery and tool trades as well as producers of chassis and other automobile parts and railway and locomotive repair shops. The metal-working industries of the eastern districts report a shortage of skilled labor and this situation also holds true in Alsace and Lorraine and likewise in the Rhone valley in Mid-France. The situation seems inexplicable except to prove once again that France has a shortage of machinery and tool equipment to deal with the situation brought about by the labor loss due to the war. The older qualified labor chiefs are falling out and no one has come along to replace them, save as machine and tool operators which are not yet recruited in sufficient numbers to handle even the summary equipment with which many French plants are fitted. The explanation given appears undeniable and the solution is equally apparent—new and modern high-production equipment.

### Value of Demonstrations

A French distributor of American machinery states that co-operation on an increased scale by American makers in, or about to enter, this market on a large scale is necessary if competition is to be met by actual demonstration of the worth of their particular specialty. Often a less efficient tool will be installed because someone who knows its capacities, though he may know its limitations as well, is able to oversee the installation and demonstrate in person its capacities. The American manufacturer, though he may work through a Paris distributor, in his own best interests should give that co-operation if he would have the increase in business which his specialty for the most part usually merits.

In the Paris district most metal-working industries are active and the better class specialist workmen from all over France seem to gravitate to this center. When they realize that like positions await them in provincial manufacturing plants they will take their knowledge of modern methods and tools to the country and the real revival of French nation-wide industry will come. For the present, save in scattered instances, the best efforts are being made by the big plants. Smaller equipment equally efficient will some day be demanded through the provinces; even the agricultural enterprises on a small and modest scale are demanding one-horse or small tractor tools in place of the bigger equipment which they often do not install just because of its handicap of bulk—and cost. This aspect of French need, and doubtless the need of many other foreign countries, is something which will one day have the attention of makers—if not those of American, why perhaps those of Germany. The subject is worthy of study.

### Customs Difficulties

Difficulties attendant upon the import of American tools and machinery into France are such that the customs regulations and formalities are a notable drawback to a more wide-spread representation by smaller distributors, leaving the manufacturer to depend almost entirely upon the half a dozen big importers. There is probably little chance of the French authorities simplifying these methods and persons unfamiliar with the traffic and who have no special facilities themselves for handling the multiple customs formalities, are bound to pass by customs brokers which add, if but a trifle, still further to the prime cost of an article. Above all the American manufacturer dealing directly with French purchasers is bound to present with his invoice and bill of lading a consular certificate of origin since now, and we hope henceforth, the United States benefits from a "reduced tariff" on many major items.

The labor wage is due for an increase as prosperity, resulting from increased output and volume of business done, becomes apparent. Already in the Department du Nord the metallurgical and fabricating workers are demanding an increase of two francs a day which brings the laborer's wage up to 25.60 francs and the specialist worker's to 30 francs. Comparison with the American wage scale will suggest that these figures of say a dollar and a dollar and twenty cents a day are factors which, if France ever gets into a real stride, are not to be ignored. As Monsieur Citroen himself put it a few months ago: "The French workman is paid thirty francs a day paper, while the American workman is paid thirty francs gold." In whatever line the comparison is applied the situation is something that hits one in the

eye, as is the French expression. If the wage earner in the automobile industry in America earns three times as much as his counterpart in Great Britain, as set forth in the *American Machinist* in a recent issue, he earns five times as much as his French colleague. There is no reason to suppose that this proportion does not apply in all metal-fabricating trades or indeed in most French industries.

An aspect of the labor question that has just been projected on the French screen has been brought out by the new decree of the Labor Ministry compelling the manufacturer to employ 10 per cent of war wounded or pensioned among his workers where the number exceeds fifteen of either sex, either native or foreign. In case this is not done a tax of 6 francs a day will be imposed, to be paid to the government pension fund, for all shortages of such percentage not employed. The industry of France, while not avowedly protesting, which would be ill-grace, are naturally critical of the economic handicap which will arise in many cases.

There has been a considerable bank note inflation since the stabilization of the franc, but with these outstanding obligations and other sight commitments the ratio of gold is bound to be held at 35 per cent. Actually the August 1 bank statement showed this to be 39.58 per cent. This encourages the belief that the financial question has been satisfactorily solved. The point now is to make the general French purchasing public believe this in order to stimulate home trade and also to enable the French manufacturer to undergo the tie-up of foreign credits for goods sold abroad. There at least he will meet stiff competition from other countries better able to stand the strain or with more elastic foreign exchange methods.

The wholesale price index has greatly improved since the last of May when stabilization was not yet a realization, but it is not apparent that these benefits have reached the consumer. By the first of August the general wholesale index has dropped from 646 to 637. Industrial materials in general from 677 to 673 and minerals and metals from 593 to 584, this latter being the best showing on the whole list.

# Industrial Machinery Exports Reach High Level

UNITED STATES shipments abroad of industrial machinery, not including locomotives, during the seven months ending July, 1928, reached a total value of $120,760,000 and surpassed the trade of any corresponding period since 1921, according to S. R. March, Industrial Machinery Division, Department of Commerce.

If the present export activity is maintained during the balance of the year, the volume for 1928 should equal that of 1921, the last year of the post-war expansion period. Shipments during July were 12 per cent in excess of the corresponding month in 1927 and slightly greater than during June of 1928. The trade of the seven months' period surpassed that of 1927 by approximately $14,200,000, or 13 per cent.

### Metal-Working Equipment Gains

The marked activity which has been manifested during recent months in the exportation of construction and conveying machinery and metal-working machinery has continued through the month of July, with the result that shipments of the former are now nearly 31 per cent in advance of the seven month period of 1927, and trade in the latter group has gained by nearly 38 per cent.

In the first group, construction machinery exports totaled $8,800,000 compared with $6,486,000 for the 1927 period—an increase of 36 per cent. Conveying machinery in this group accounted for exports of $5,515,000 compared with $4,398,000 for the seven months of 1927, a gain of 25 per cent. The trade in cranes has made unusual strides, reaching a total of $1,928,000 as compared with $832,000 for the seven months of 1927, and representing a gain of 132 per cent.

The trade increases that occurred in the metal-working machinery group were shared by most of the types in this class. Perhaps the most noteworthy gain, however, occurred in lathes and milling machines, the former accounting for a trade valued at $2,590,600 as compared with $1,663,000 in 1927, and the latter for $1,470,500 or more than double the 1927 trade.

Exports of mining and quarrying machinery have continued on the same level as 1927, but the trade in oil well and oil refining machinery has shown a pronounced decline. The trade in miscellaneous machinery continued to gain, increases being distributed over a wide range of items.

## Automotive Production Remains at a High Level

July production (factory sales) of motor vehicles in the United States, amounted to 390,445 vehicles of which 337,933 were passenger cars and the remainder were trucks. The July production represents a high level and an increase of 45.4 per cent over July, 1927. Motor vehicle output in 1928 except for January has been consistently above that for the preceding year. The total for the first 7 months of 1928 was 2,592,592 vehicles as compared with 2,337,459 vehicles in the corresponding period of 1927, representing an increase of 10.9 per cent. Passenger car production for the same period showed an increase of 12.9 per cent over the first seven months of 1927, while truck production, January to July, inclusive, was 3.1 per cent below the output for those months last year.

Automobile companies reporting last week their production in August increased the indications that the total output of the industry during that month would exceed 350,000 units, surpassing all records for August. Production schedules now are said to be 50 per cent higher than at this time last year.

## Industrial Engineers to Hold Meeting in Rochester

"Campaigning for Lower Costs" is to be the major theme of the fifteenth national convention of the Society of Industrial Engineers, to be held in Rochester, N. Y., October 17-19, in cooperation with the Industrial Management Council of the Rochester Chamber of Commerce. The convention headquarters will be at the Hotel Seneca, and meetings will be held there and at the Chamber of Commerce assembly rooms. Virgil M. Palmer, of the Eastman Kodak Co., is chairman of the Rochester executive committee, while A. E. Crocket, of the Industrial Management Council, is chairman of the plant inspection committee.

### Plant Inspections

Plant inspections will be an important feature of the convention. On October 17, the Bausch & Lomb Optical Co., the Gleason Works, and the North East Electric Co. will be visited; on the 18th, the Eastman Kodak Co., the Taylor Instrument Companies, and the General Railway Signal Co.; and on the 19th, the Stromberg-Carlson Telephone Manufacturing Co., the Bastian Brothers Co., and the Hickey-Freeman Company.

At the opening morning session on Wednesday, the 17th, the general subject will be "Profit Producing Management." Inspections will take place in the afternoon. In the evening, the Fatigue Elimination Committee will hold an open dinner meeting, and later the Waste Elimination Committee will hold a session on the general subject of "Reducing Operating Costs through the Introduction of Production Schedules."

On Thursday, there is to be a sales executive session, an educators' forum, and a session on waste control and salvage. The banquet will be held in the evening. At the manufacturing session on Friday morning, with C. E. Knoeppel presiding, three phases of incentive will be discussed: Fundamental Principles of Wage Incentives; The Advantages of Group Bonus; and Other Incentive Systems. "The Application of Scientific Management Principles to Plant Maintenance Work," will be the subject at the simultaneous session of the maintenance engineers section. The closing session in the evening will be on Time Study Engineering Standardization, and the entire evening will be devoted to this subject.

## Measuring Instruments to Be Discussed and Exhibited

Measurement is to be the subject of discussion at a meeting to be held under the joint auspices of the Museums of the Peaceful Arts and the Machine Shop Practice Division at the American Society of Mechanical Engineers, October 17, in the Engineering Societies Building, New York City. After the discussion, the meeting will adjoin to the museum nearby to view a loan exhibit of measuring devices, participated in by the Pratt & Whitney Co., the Brown & Sharpe Manufacturing Co., the Bausch & Lomb Optical Co., John Bath & Co., the Jones & Lamson Machine Co., the Bureau of Standards, and others. The collection will be opened that night and will be on exhibition at the museum for one month.

Dr. George K. Burgess, director of the Bureau of Standards, is to preside, and two papers will be given, the first by Prof. James A. Hall, of Brown University, on Measuring Devices, Primarily Manual; and the second by Prof. Earle Buckingham, of the Massachusetts Institute of Technology, on the Development of Automatic Measuring Devices and Use of Optical Methods. An active discussion by experts is assured through representatives from the Bausch & Lomb Optical Co., the Bureau of Standards and others.

## Railroads Must Replace 300,000 Wooden Cars

As a result of the new rule of the American Railway Association against the use of wooden cars, which will become effective Jan. 1, 1931, railway equipment manufacturers estimate that orders will have to be placed for about 300,000 new steel freight cars. Between now and the time the rule goes into effect the railroads of the country will complete the process of replacing existing wooden equipment with new steel-framed cars.

## Italy's Machinery Imports Decline Sharply in 1927

Italy's imports of machinery declined abruptly during 1927 as compared with 1926 and 1925, according to complete trade returns now available, Assistant Commercial Attache A. A. Osborne, Rome, reports to the Department of Commerce.

Decline has gone on steadily since it began in the third quarter of 1926, and it has affected the trade with all countries. Germany, which during the past three years has supplied approximately half of the machinery imported into Italy, suffered a decrease in trade of 41 per cent as compared with 1926, and 36 per cent as compared with 1925.

The United States, which supplies only 8 per cent of the tonnage and 12 per cent of the value of the machinery imported into Italy, lost 36 per cent in tonnage and more than 41 per cent in value as compared with 1926, and 17 per cent in tonnage and 37 per cent in value as compared with 1925.

The importation of strictly industrial machinery showed decreases in practically all classes, owing to the industrial depression which began in 1926 and continued throughout the following year. The three leading classes of industrial machinery entering Italy, namely, machine tools, spinning machinery, and weaving equipment, suffered particularly heavy declines. The total tonnage of machine tools imported into Italy during 1927 represented only 53 per cent of the imports of 1926 and 40 per cent of the trade of 1925, according to the report.

## Curtiss to Build New Radial Airplane Motor

A new plant for manufacture of a new radial airplane motor for commercial airplanes will be erected in Buffalo by Curtiss Aeroplane & Motor Co., according to the *Wall Street Journal*. The plant, which will have floor space of 300,000 sq.ft., will be twice as large as the present Curtiss plant. The company has secured options of 50 acres in the same part of the city in which the present plant is situated, on which it will erect a complete plant equipped with latest automotive machinery for manufacture of the "Challenger" motor. The company is installing $225,000 of modern machinery in the present plant with which to make 300 of the new motors this winter before the new plant is in operation, in the spring or the summer of next year.

## Machinists to Convene

The International Association of Machinists will convene at the Biltmore Hotel, Atlanta, Ga., beginning September 17. The meetings will extend over a period of two weeks and about four hundred delegates are expected to be present. Atlanta is the birthplace of the association as the first lodge was formed there in 1888. As the association convenes only once every four years and as this is the fortieth anniversary of its founding, considerable importance is attached to the meeting by the group.

## Bliss & Laughlin to Build $1,000,000 Plant in Buffalo

A new plant, said to be planned with the idea of making it the most modern of its kind, is to be erected in Buffalo in the immediate future at the cost of about $1,000,000 by Bliss & Laughlin, Inc., of Chicago and Harvey, Ill. The Buffalo plant will be devoted to the same product as is being manufactured at the Harvey plant, including cold-drawn stock and turned and polished or ground shafting. Walter R. Howell, vice-president and general manager, will be in direct charge. He has been connected with the steel business for the past 25 years. Although the Harvey plant has been completely modernized in the past eight years, it will be exceeded in the quality of its facilities by the new Buffalo plant.

## Labor Conditions in the Metal Industries

A study of hours of labor and earnings of employees engaged in the manufacture of aluminum, brass, and copper wares, and in mills making brass and copper sheets, rods, tubes, wire, and shapes is reported by the U. S. Bureau of Labor Statistics. In the former group the average full-time hours per week of male and female employees combined were 52.3; and the average full-time weekly earnings were $26.83; while in the copper and brass mills, the average full-time hours per week were 53.8; and the average full-time weekly earnings, $29.70, according to the report.

## New Departure Expands Forge Plant

Ground will be broken within a month for a large addition to the main forge plant of the New Departure Manufacturing Co. at Bristol, Conn., to take care of the increased demand for the company's product by automobile, machine tool, electric motor, farm machinery and other manufacturers. The addition will be 200 ft. long by 126 ft. wide and will adjoin the present plant, making the entire structure a building 800 ft. long.

The new building will increase the daily production capacity from 160,000 to 175,000 ball bearings. Additional machinery is to be installed in other parts of the Bristol and Meriden plants to take care of the increased production at the forge plant. The addition will be slightly different in construction from that of the present building in that it will be somewhat higher and will have a brick floor. Otherwise it will be the same, constructed of concrete, steel and brick, with large windows for light and a cross type of ventilated roof. The building will be equipped with two cranes, crosswise, which will serve the entire building, and twelve upset forging machines.

## Steel Production High

Production of open-hearth and bessemer steel ingots in August was 4,178,481 gross tons, compared with 3,811,573 tons in July, and 3,498,549 tons in August, 1927, according to figures of the American Iron & Steel Institute based on actual production of concerns that in 1927 produced 94.68 per cent of the country's total. Production for the eight months to August set a new high record at 32,782,937 tons, compared with 30,510,071 tons in the first eight months of 1927 and with 31,775,768 tons in the corresponding period of 1926, the previous record.

# *The Business Barometer*

## The outlook in Commerce, Finance, Agriculture and Industry

By THEODORE H. PRICE

*Editor, Commerce and Finance, New York*

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ANNOUNCEMENT has been made that the amount borrowed by members of the New York Stock Exchange has increased by $214,000,000 during the month of August. The total of such loans is now $5,051,000,000, and if to this sum there could be added the amount borrowed against the securities of those who are non-members of the Stock Exchange, it would probably be found that ten billions of dollars of credit is so employed.

But Wall Street is becoming accustomed to these so-called brokers' loans, and it is now said that the prices at which stocks are selling reflect the country's wealth and prosperity, and that it does not make any difference whether those who own the stocks borrow against them or not. Those who take this stand maintain that an investor simply transfers part of his investment by borrowing against his securities, and that the transaction does not deplete the net amount of credit available.

"On with the dance, let joy be unconfined," expresses the present attitude of many speculators who have become wealthy. Those conservatives who suggest that it is better to be safe than sorry are regarded as out of date, and a new school of economists seems to have the public ear. Its adherents claim that since there can be no money panic there is no reason why stocks should not continue to advance as the equity which they represent increases, and that an advance of one hundred points in a given security is no reason why it should not continue to rise.

Taken literally this is true, but one of the wise old Rothschilds once said, "The trees never grow to the skies," and the present disregard of experience and precedent is coming to convince many that we are in a period of inflation, of whose existence those most affected are unaware. The only reason for not accepting this theory is that the advance has been confined to securities and city real estate, and that commodity prices have not yet shared in it. Therefore, the latter should be carefully watched, and if they commence to go up in anything like unison it may be taken for granted that the expansion will continue until the increased supply of credit has been absorbed.

Meantime, there can be no doubt that business is improving, and that distributors are more inclined than they were to anticipate their requirements. This is true even of cotton textiles, for which there has been a somewhat better demand. The improvement is particularly due to the New Bedford strike and shut-down to which many mills have resorted, but it is also traceable to the steadiness of raw cotton, which has shown remarkable firmness while waiting for the government report that is to be issued after the close of the market for the week.

Corn and wheat have also been steady in the face of statistics that some consider bearish, and sugar and rubber are about the only agricultural products that have not been self-supporting. This may be due to the withdrawal of the artificial support that they have received until recently, for there is no denying that both are now below what is believed to be the cost of production.

An increase of industrial activity is also reported, and while the car loadings for the week ending August 25 were 2 per cent under last year, most of the decrease is in coal cars. The steel mills continue surprisingly busy. Building activity is well maintained. The woolen manufacturers are cheered by the business booked at last week's openings, and the chain stores report increasing sales.

The news from Europe and the Orient is encouraging. The signs of a world-wide revival in business need not be recounted in great detail. Taken altogether they are profoundly significant, and would seem to justify America's confidence in the future. The question is, do they indicate a prolonged period of profitable activity? To this question, the answer would be "Yes," were it not for the 8 per cent money market that is reported from day to day in Wall Street. The prevailing optimism has thus far been equal to the strain that the high rates of interest have put upon it, but the old-fashioned man, though discredited, will continue to doubt whether dear money and high prices will be permanently compatible.

### WHAT'S DOING IN INDUSTRY

**IN MOST machine tool centers, August business was well above that of July and in several instances, notably in Chicago, exceeded in volume any previous record for that month. The fall is entered with considerable optimism on all sides. September is expected to be a banner month in Cleveland, and in Detroit it is expected that the month's business will exceed that of August. For the first time there, employment has continued to rise during the entire summer, with no letup in sight. No doubt the cause of this absence of saturation is the unusual activity in the automotive shops.**

**THIS activity is reflected in the sale of machine tools in many centers. In Milwaukee, for example, automobile builders are the dominant buyers, as they are in Cleveland and Detroit. This class of purchaser is strongly felt in the New England market, and is attracting attention in Cincinnati.**

**NOW that the vacation season is over, the volume and tone of inquiries is very encouraging all over the country and, with the exception of automotive shops, is well diversified and scattered, indicating considerable general metal-working activity. About the only source that is weak is the railroads, which have been buying tool equipment from hand to mouth for many months. Little change is expected in the near future.**

**EMPLOYMENT in shops building machine tools remains high, and, in fact, there is a serious shortage of skilled machinists in many cities, such as Milwaukee, Cleveland and Cincinnati.**

## High Employment Found in Machine Tool Shops

Compared with the total number of employees on the payroll in July, 1927, there were 11.4 per cent more in July of this year in shops making machine tools, according to returns made to the Bureau of Labor Statistics, U. S. Department of Labor. The increase over the number employed in June, 1928, was 1.5 per cent. Other groups that gained during the 12-month period were automobile shops, 28.3 per cent, and agricultural equipment factories, 21.3 per cent. In general, employment in July of this year stood 3 per cent below the level of employment in July, 1927, and 1.1 per cent lower than in June, 1928. Compared with June, the falling off in employment was considerably less, however, than it was in July of 1923, 1924, 1926, and 1927, and was the same as for July, 1925. Increased employment, however, was shown in 18 out of 54 separate industries.

# *The Industrial Review*

## Weekly progress of the machinery and machine tool business

THE following reports, gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

### NEW ENGLAND

During the past week the machine tool market resumed a more forward tendency. With the vacation season over, orders are expected to be placed more promptly. Bookings of small machine tools, for some time a New England feature, showed a notable increase over the previous week. The Greenfield Tap & Die Corporation, reports a heavier production to date this year than during the same period last year. The Standard Screw Co., Hartford, also reports production ahead of last year. The Geometric Tool Co., New Haven, has been operating its plant at practically full schedule all year. Another full schedule plant is that of Pratt & Whitney Co., Hartford. Inquiries for production and precision units are coming in good numbers, and run ahead of orders placed for this kind of machinery.

The automotive industry continues to buy strongly for replacement principally, but gives promise of coming into the market soon for new equipment. Dealers are finding a ready market for first-class rebuilt machines that have every appearance of being able to withstand a reasonable amount of wear and tear. One dealer, who turns over a good amount of second-hand machinery claims it is more profitable and better business to overhaul and replace parts before disposing of a machine.

The current week showed a decided increase in inquiries. Business conditions are in line with the prediction voiced for the past four weeks, and the early influx of lists in September promises to fulfill all expectations for this month. Some manufacturers are hopeful or optimistic enough to believe this month will be their banner one of the year.

Orders placed include a lathe, two jig boring machines, a shaper, a vertical drill, and two milling machines, all new units. Used tools embraced grinding units, small automatics, a rebuilt shaper and bench lathes and drills.

### MILWAUKEE

With the close of the vacation season and the greater concentration in business, activity in the metal-working equipment industry is again on the rise, and the volume of business is expanding accordingly. Most shops building tools entered September with a very satisfactory quantity of orders on their books, and efforts to maintain the pace of new business are reported as being well rewarded. Production continues at the recent high rate, with little prospect of enlargement in view of the scarcity of skilled machinists. Most orders for equipment carry insistent demands for quick shipment, making the shortage of help rather acute at the moment.

Automobile factories once more loom up in the picture as the predominant source of new business and as the most insistent purchasers with respect to prompt deliveries due to the relatively excellent demand for new cars which is keeping most factories behind orders from dealers. Specialists in high-production tools not only are straining capacity, but are getting orders that will carry them several months because of the longer time required to build the special designs for particular purposes.

Manufacturers of motor trucks, tractors and farm machinery, while not the active buyers of earlier months, nevertheless are furnishing moderately active inquiry and considerable new business in the aggregate. Their prospects for the spring of 1929 are considered promising, and fall and winter production schedules are being based liberally.

Railroad business remains slow and no one is willing to make any predictions, merely expressing the hope that the long-deferred buying movement will set in soon.

### DETROIT

There is every reason to believe that September will be a better month than August in the machinery and machine tool trade in the Detroit area. August was above the average for this time of year and hence most dealers are very well pleased with the general situation here.

Studebaker, Graham-Paige, Dodge, Chrysler and many of the other automobile manufacturers are unusually busy. The sale of cars continues at a high level and many new models have increased sales considerably and have made a market for machinery. There is a great deal of balancing up and filling in and there is also considerable expansion in the offing.

The small shops are extremely active and are doing a fair amount of buying. Ford is still increasing his capacity and is making occasional purchases.

Employment gained nearly 5,000 this week, 6,000 last week and 7,000 the week before. General business conditions are excellent and with the end of the vacation season are getting better.

### CLEVELAND

Present indications are that September will be a banner month for the local machine tool industry. With a few exceptions the trade reports the condition as very active during the past two weeks. August, usually a dull month, has proved an exception to the rule this year. Sales exceeded July by a good margin. A wider variety of equipment is being purchased, and some significance is placed in the fact that manufacturers are replenishing their equipment. The demand from the automotive industry leads the market. Inquiries continue to pick up with larger lists more plentiful.

Increased production of machinery and machine tools has caused a pronounced scarcity of the all-round type of machinist. Large advertisements are being used to attract men.

The Cleveland Board of Education will receive bids on September 17 for machinery for woodworking, sheet-metal shops, foundry and print shops at various schools.

### CINCINNATI

Machine tool manufacturers in the Cincinnati district report that business held up very well in the past week. It was stated by the great majority that they did better than hold their own and in no case was a decreased volume of sales reported. The general expectancy is that the market trend will be upward during the present month, and by some it is predicted that sales will reach a much higher level in a short time. "When our books were closed for August," stated the head of one large concern, "I was very much surprised to find that the month's sales had exceeded our expectations."

Selling agents report that the past week's sales have shown an increase and state that the market gradually is becoming more active in local and adjacent territory.

A slightly increased amount of buying was done in the week by the automotive and allied industries, the latter being the larger buyer in most instances. The greater part of the week's business came from general machinists and miscellaneous users, well scattered, whose requirements were largely confined to single tools and whose orders were well diversified as to sizes and types of tools.

Inquiries came in freely during the week, the great majority being from general machinists and miscellaneous users. These were well diversified and well scattered over the country, the greater part being in regard to single tools. An increased volume of inquiries that came from the automobile manufacturers and allied industries is taken as an indication that they are about to do an increased amount of buying.

### CHICAGO

While manufacturers of and dealers in machine tools hesitate to make forecasts thus early in September with reference to the month's prospective business, they are practically of one mind in declaring that there will be no great change in conditions, though none is optimistic enough to suggest that August's record of sales may be equalled. Last month's sales are reported by the leading machine tool houses to have broken records, an executive of one of the oldest and largest machinery concerns stating that, with one exception, the sales of his house for August exceeded those of any month since the firm was established. The distribution has been wide and general, and has included tools of every kind and character, large and small.

The immediate outlook is declared to be decidedly favorable. Reports from Milwaukee are to the effect that the Allis-Chalmers Manufacturing Co. will shortly issue a list for new equipment totalling close to $100,000, and that the list issued some weeks ago by the O. A. Smith Corporation still contains many unclosed items. The International Harvester Co. is reported to be preparing a new list which will run to large figures.

Railroad buying still continues to be limited to small lots, and there has been no intimation that any lists of consequence are contemplated for the near future. Business in used tools is moderately active, with inquiries increasing in number.

### NEW YORK

While the number of actual orders placed during the last week for machine tools has not been large, there is every indication that September will be an active month for most dealers and factory representatives, judging from the volume and tone of inquiries received. This anticipated business is to come from well diversified sources, indicating that there is considerable industrial activity in the metropolitan district. Even the smaller shops are showing interest in new equipment and are apparently well occupied with orders, some of them for many months ahead. Several big deals are said to be pending, one involving about $100,000 worth of equipment, but the few who seem to be informed on them are quite mysterious at this date. Bids for machinery for the proposed Lancia plant in Poughkeepsie are now said to be under consideration in Italy.

The two leading buyers during the summer, the General Electric Co. and the Wright Aeronautical Corporation, continue

to place orders here and there to fill in previous purchases, but no large quantity buying is expected, from the latter particularly, for a couple of months. For one dealer the past week was an excellent one as far as orders went, but this case seemed to be an exception to the general rule, particularly for the larger concerns.

The New York Central R.R. came into the market for a few tools last week, including two Rooksby cylinder joint facers and a lathe, and issued inquiries for additional equipment. The Erie R.R. has also inquired for some tools, but aside from these two roads, the railroad market is reported to be very slow by two large firms specializing in such equipment and serving the entire country. No material change is expected to take place for some time.

The Triplex Machine Tool Co. reports an active week with additional business in sight. Among the machines sold by this concern were: two Swiss jig borers, one to a concern in New Jersey, the other to one in New England; two "General" flexible presses, one high-speed Edlund drill, one Anderson power scraper, one automatic surface grinder, and an Ames bench lathe.

The Pratt & Whitney Co. is still doing an excellent volume of business and looks to a good fall. Among the sales reported in the past week were: four engine lathes, one bench lathe, one 6-spindle deep-hole drill, four jig borers, a 6-in. vertical shaper, a 30-in. profiler, and a 5-in. production hand miller. The Niles Tool Works Co. sold a 48-in. car-wheel borer, a combination journal turning and axle lathe, and a 60-in.x41½-ft. heavy lathe, the last to a steel company. The machinery division of Niles-Bement-Pond Co. sold three Morris radial drills, two Aurora drills, a Rahn-Larman gap lathe, and two Cincinnati high-speed tappers. The crane division reported the sale of nine cranes ranging in capacity from 5 to 40 tons.

A large manufacturer of plating and polishing equipment reports the largest monthly sales in August than in any month this year.

## PHILADELPHIA

Business in the machinery and machine tool lines in Philadelphia during the last two weeks displayed a better tone than it has for some months. Some fairly large orders were placed by industrial concerns, and plants generally were reported to be operating closer to capacity than they had been heretofore.

Inquiries showed a rather healthy tone and presented prospects of early orders. Manufacturers and dealers in heavy tools for railroads, however, were not optimistic of the future. There are no indications that the railroads will enter the market with anything but hand-to-mouth buying, dealers said, notwithstanding the favorable reports of substantial earnings by some of the carriers. Industrial leaders generally expressed the belief the Philadelphia area is entering the fall under favorable basic conditions, and under a situation that is better than it was a year ago.

## BUFFALO

Business in the machine tool trade of this district did not wait for Labor Day to show improvement. Final figures on the month of August indicate that the volume of business was better than that of 1927, much better in some instances, and at the worst only a few dissenting cases. Inquiries are brisk with the opening of September, and there is every reason to believe that the fall sales will be record breakers. One dealer states he expects this to be his best year since 1923. One factor that helped late August business was the letting of machinery contracts for several schools for September opening.

A like condition of increased business is developing in the electrical equipment field. Conditions here are similar to those in the machine tool field, except that a few large orders have been placed for electrical equipment while most machine tool orders have been for single machines in a wide variety of industries, a basically healthy condition.

The demand for contractors equipment is also holding up well. Several contracts for buildings of various types have been let for fall and winter construction. The road machinery business this year was about normal. All in the field are viewing the fall with exceptional optimism.

## INDIANAPOLIS

A rather spotted condition is seen in the local machine tool and machinery business following the summer lull. In some instances the demand seems to be picking up, but some industrials have not recovered from the vacation period. A fair volume of inquiries from these laggards is being received, however, lending a tone of optimism to the general situation.

While all indications point toward some buying on the part of the railroads, they have disappointed the trade as yet. However, work of rejuvenating the shops is under way and more men are being employed. Some buying from this source is expected this month. The particularly bright spot right now seems to be from the coal fields, where preparations are being made all along the line for a resumption of work. Some equipment already has been purchased, mostly from the strip mine operators, who have not been affected as seriously by the strike as the pit mines. With the Illinois miners expected to return to work by the middle of the month, it is thought the Indiana operators will settle at approximately the same figure and that most mines will begin shortly. A lot of machinery will have to be replaced before full operation is secured.

While dealers in woodworking machinery report a rather dull summer, the furniture factories and body factories are making some inquiries. It is known the furniture factories are well situated for fall business and some orders are expected. Some demand for woodworking machinery also comes from the flooring and interior finish factories in the state.

Truck and tractor factories, while not heavy buyers, seem to be consistent and most of them are well supplied with orders. Dealers in second-hand machinery report only a fair business.

# Members Fail to Ratify Mill Supply Group Amalgamation

Due to an adverse vote of members of the National Supply and Machinery Dealers' Association of 80 to 19, the proposed amalgamation of that group with the American Supply and Machinery Manufacturers Association and the Southern Supply and Machinery Dealers' Association has failed, although the idea was approved at the last joint meeting of the three groups. Members of the American association voted 109 in favor and 3 against the merger, while the Southern group voted 81 in favor and 1 against the amalgamation, which was intended to foster group co-operation and to prevent duplication of effort.

In view of this situation, Dixon C. Williams, president of the American association has called a meeting for September 18 at the William Penn Hotel, Pittsburgh, Pa., to determine whether a union with the Southern dealers group is to be attempted or whether his organization will continue as a separate organization as in the past.

# Vanadium-Alloys Steel Co. to Absorb Colonial Steel Co.

At a recent meeting of the board of directors of the Vanadium-Alloys Steel Co., of Latrobe, Pa., a proposal which later received favorable consideration was made to the directors of the Colonial Steel Co., of Pittsburgh, Pa., whereby shares of stock of the Colonial Steel Co. are to be exchanged for shares of stock of the Vanadium-Alloys Steel Co. A meeting of the stockholders of the Vanadium-Alloys company has been called for October 30 to approve the action of the directors. No changes in the management of the Colonial company are contemplated for the present, except that the sales of the products of the two companies will be co-ordinated. George P. Rhodes, T. Howe Childs, and S. Clarke Reed, will be the representatives of the Colonial company on the board of the Vanadium-Alloys company.

# American Machine Tools Well Represented at British Exhibit

According to advance reports, a considerable number of American machine tools are being shown at fourth Machine Tool and Engineering Exhibition, being held under the auspices of the Machine Tool Trades Association at Olympia, London, England, from September 5 to 22. British-made machines predominated, of course, and there are a few Swiss and French machines being shown, but German exhibits, as in the past, are barred despite the protest of the British technical press, and from users of tools.

Among the American machine tools represented are: Henry & Wright dieing machine; gear checking machine by the National Tool Co.; Rockwell Dilatometer and the Rockwell hardness tester; portable tools of the U. S. Electrical Tool Co.; board hammer made in England under license of the Billings & Spencer Co.; Bullard 6-spindle Mult-Au-Matic and vertical turret lathe, exhibited for the first time in England; Brown & Sharpe automatic screw machines, gear hobber and plain grinder; Pratt & Whitney lathes, 6-in. vertical shaper and No. 1A jig borer; Bryant No. 3 semi-automatic hole grinder; Gleason 10-in. manufacturing spiral-bevel gear generator and 8-in. straight bevel gear generator; American Tool Works Co. lathe and 3-ft. radial drill; Seneca Falls Machine Co. type R automatic "Lo-Swing" lathe; Milwaukee-Mil duplex milling machine; Gisholt type L combination turret lathe; Le Blond "Multicut" lathe; Gould & Eberhardt gear hobber; horizontal-table type grinder by the Abrasive Machine Tool Co.; Hutto cylinder-bore honing machine; and Natco multiple-spindle drilling machine.

Gisholt static balancing machine; Garvin automatic tapping machine by the Western Tool Works Co.; Ander-

son power scraper; Cincinnati duplex automatic milling machine and a universal type; Warner & Swasey universal turret lathe; Potter & Johnson automatic chucking machine; Gridley automatic; Cincinnati-Bickford radial drill; Baker hydraulic-feed drilling and boring machine; Churchill-Cincinnati centerless grinder; J. N. LaPointe variable-speed hydraulic broaching machine; 2-spindle Avey upright drill; Grant riveters; Gaterman pneumatic oscillating tapping machine; Ajax forging machines; Anderson automatic tapping machine; Logansport air-operated arbor press, and two Fellows gear shapers.

In the grinding section also are a Heald Size-matic internal grinder and several Norton machines.

## Personals

PETER S. MCELROY has recently resigned as vice-president of the Peninsular Machinery Co., Detroit.

HUGH V. CONRAD, formerly with Ingersoll-Rand Co., was elected vice-president and secretary of the Allen & Billmyre Co., New York City.

WILSON P. HUNT, president of the Moline Tool Co., is succeeding Col. G. F. Jenks as chairman of the Tri-city Section of the American Society of Mechanical Engineers.

J. STANLEY SEE has been promoted from production engineer to manager of the industrial division of Industrial Brownhoist Corporation, Bay City, Michigan.

AUGUST WILKS, for the past five years production manager of the Hoover Vacuum Sweeper Co., Canton, Ohio, is now works manager of the Kearney & Trecker Corporation, of Milwaukee.

A. W. VAN BUREN, district manager of sales in Chicago for the Consolidated Machine Tool Corporation of America, has tendered his resignation, effective Oct. 1. His successor has not been announced.

C. L. TAYLOR has resigned his position as chief engineer of the Morgan Engineering Co., Alliance, Ohio, to become vice-president and head of the engineering department of the Aetna Standard Engineering Co., of Youngstown, Ohio.

V. F. HALLIBURTON has changed his position as engineer and assistant purchasing agent of the Mid-Continent Petroleum Corporation, and is now connected with the Spartan Aircraft Co., Tulsa, Oklahoma, in the capacity of purchasing agent.

C. M. CHEADLE, JR., formerly advertising manager of the Barber-Colman Co., Rockford, and more recently associated with the Geo. F. McKiernan Advertising Agency in that city, is now advertising manager of the Kearney & Trecker Corporation of Milwaukee.

FRED C. GARDNER, treasurer of the E. C. Atkins Co., saw and machinery manufacturer of Indianapolis, has been named chairman of a special committee to recommend a site for a municipal airport for Indianapolis.

WALTER HASSELHORN, vice-chairman, Time Study Engineering Standardization Committee of the Society of Industrial Engineers, has resigned his position at Wilson & Co. and is now on the industrial engineering staff of Stevenson, Harrison & Jordan, Chicago office.

H. C. BOULTON has been appointed manager of the Northern Ohio district for the Pittsburgh Grinding Wheel Co., of Rochester, Pa. Mr. Boulton's headquarters are at 1988 E. 66th St., Cleveland. The Cleveland agency was formerly in charge of C. G. Emery, who resigned to join the sales force of the Macklin Co., Jackson, Michigan.

WALTER J. KOHLER, president of the Kohler Co., Kohler, Wis., manufacturer of bathtubs and other sanitary ware, electric lighting units for isolated places, etc., was nominated Republican candidate for governor of Wisconsin at the primary election on Sept. 4. He defeated Congressman Joseph D. Beck, who ran for the nomination with Robert M. LaFollette, Jr., successful candidate for renomination as United States Senator.

EARLE W. MCMULLEN of Kenosha, Wis., has become associated with the J. E. Burke Co., Fond du Lac, Wis., manufacturer of steel radiator covers and humidifiers, as general manager. He was graduated from Armour Institute of Technology in 1909 and since 1913 has been associated with the Kenosha works of the Simons Co., maker of steel beds and furniture.

BENJAMIN F. FAUNCE has resigned as superintendent of the car department of the Cambria plant of the Bethlehem Steel Corporation and will be succeeded by Lindsay C. Pritner. Mr. Faunce will devote his time to the Brown-Fayro Co., manufacturer of machine boilers, coal and ore tipples, chutes, mine pumps, etc., at the Sheridan plant. Mr. Faunce organized the Fayro Machine & Engineering Co., Johnstown, Pa., in 1921, and is president of the company.

BERNARD LESTER, assistant industrial sales manager of the Westinghouse Electric and Manufacturing Co., has been placed in charge of the company's business relationships with architects, builders, building contractors, and manufacturers of machinery and motor-driven appliances. His headquarters are at 150 Broadway, New York City. Mr. Lester has been identified with the Westinghouse company for over twenty years and is widely known in industrial circles. He has devoted himself to the study of the economic application of electric power for industrial and domestic purposes and is recognized as one of the leading authorities on this subject.

## Obituaries

WILLIAM H. YAWGER, vice-president of the Weston Electrical Instrument Corporation, Newark, N. J., died on September 3. He had been associated with the corporation and its predecessor for more than 34 years, serving as director of purchases and subsequently as treasurer and vice-president. Mr. Yawger retired from active duty about three months ago on account of failing health.

JOSEPH A. JEFFREY, aged 92, who was one of the founders and was former president of the Jeffrey Manufacturing Co., of Columbus, Ohio, large manufacturer of mining and conveying equipment, died Aug. 27. In 1883 he and a number of associates secured the controlling interest in the Lechner Machine Co., which was reorganized into the Jeffrey Manufacturing Co. He served as president until 1900 when he was succeeded by his eldest son Robert M. Jeffrey and named chairman of the board of directors, the position he held until the time of his death.

## Business Items

The Erie City Iron Works announces that it has appointed Alan G. Cary & Co. as its sales representative in St. Paul, Minn.

The Highland Iron & Steel Co. will construct another unit to its plant at Terre Haute, Ind., giving it a third mill which will increase the factory 25 per cent. About 100 men will be added to the payroll. The unit will be in operation by Nov. 1.

Remodeling work has been started on the buildings which are on each side of the National Mill Supply Co., machinery and supply dealers of Fort Wayne, Ind. In the plan for remodeling, the building, which now is three stories high, will be raised to five floors and the frontage will be increased to 70 feet. It is expected the work will be completed by Dec. 1.

Articles of incorporation have been filed by the Richmond Hammered Ring Co. of Richmond, Ind. The corporation has an initial capital stock of 500 shares of no par value and is formed "for the manufacturing and providing by the various and several means, merchandising, selling, handling, distributing metal products." The incorporators are Wilbur C. Hibberd, Earl W. Allen and Richard A. Booker.

The Hill Clutch Machine & Foundry Co., of Cleveland, Ohio, announces the appointment of the following dealers in the territories indicated: Harry P. Leu, Orlando, Fla., southern half of Florida; Engineering Sales Co., Saginaw, Mich., "Thumb" district of Michigan; F. C. Richmond Machinery Co., Salt Lake City, Utah, district of Utah, Idaho, Nevada and Wyoming; Arthur E. Jones, Syracuse, N. Y., western portion of New York State; Hollis & Co., Little Rock, Ark., southern half of Arkansas; and San Antonio Machine & Supply Co., San Antonio, Tex., Southern Texas.

## Forthcoming Meetings

**American Railway Tool Foremen's Association.** Annual meeting, Hotel Sherman, Chicago, Sept. 12, 13 and 14. G. G. Macina, secretary, 11402 Calumet Ave., Chicago.

**American Railway Tool Foreman's Association.** Sixteenth annual convention of the Supply Association, Hotel Sherman, Chicago, Sept. 12, 13 and 14. F. A. Armstrong, secretary, the Pratt & Whitney Co., 564 W. Monroe St., Chicago.

**Machine Shop Practice Division, American Society of Mechanical Engineers.** National meeting, Cincinnati, Sept. 24-26. Part of sessions to be on steamer "Cincinnati." Secretary, Carlos de Zafra, 29 W. 39th St., New York City.

**American Society of Mechanical Engineers.** Boston Regional meeting, Oct. 1-3. C. E. Davies, secretary, 29 W. 39th St., New York City.

**National Safety Council.** Seventeenth annual safety congress to be held in New York, October 1-5. W. H. Cameron, managing director, 108 E. Ohio St., Chicago.

**American Society for Steel Treating.** "National Metals Exposition," Commercial Museum, Philadelphia, Pa., week of Oct. 8. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

**American Welding Society.** Fall meeting and exposition, Exhibition Hall of Commercial Museum, Philadelphia, Pa., Oct. 8-12, in conjunction with "National Metals Exposition" of the American Society for Steel Treating. Miss M. M. Kelly, secretary, 29 West 39th St., New York City.

**Institute of Metals,** Division of American Institute of Mining and Metallurgical Engineers. Annual fall meeting during National Metal Week, Oct. 8-12, Benjamin Franklin Hotel, Philadelphia. W. M. Corse, secretary, 810 18th St., N. W., Washington, D. C.

**American Gear Manufacturers' Association.** Semi-annual meeting, including joint session with the Machine Shop Practice Division of the American Society of Mechanical Engineers, Statler Hotel, Buffalo, N. Y., Oct. 11-13. T. W. Owen, secretary, 3608 Euclid Ave., Cleveland, Ohio.

**Society of Industrial Engineers.** Fifteenth annual convention, Rochester, N. Y., October 17-19, in conjunction with the Industrial Management Council of the Rochester Chamber of Commerce. George C. Dent, executive secretary, 205 Wacker Drive, Chicago.

**National Manufacturers' Association.** Combined assembly with the National Industrial Council in New York City, October 22-24. George S. Doudinot, secretary, 11 W. 42nd St., New York City.

**American Management Association.** Autumn convention, Palmer House, Chicago, Nov. 13-15. W. J. Donald, managing director, 20 Vesey St., New York City.

**Iron and Steel Division, American Society of Mechanical Engineers.** Second national meeting, Chicago, November 14-15. Thomas Wilson, chairman of Chicago local section host, 7 S. Dearborn St., Chicago.

**American Society of Mechanical Engineers.** Annual meeting, Engineering Societies Bldg., New York, week of Dec. 3. Calvin W. Rice, secretary, 29 W. 39th St., New York City.

# The Weekly Price Guide

### *Rise and Fall of the Market*

THE tendency toward firmness in prices of shop materials and supplies, that has characterized the last two weeks, is still strongly in evidence. Babbitt metal advanced ½c. per lb. this week; higher prices are being paid for scrap brass and lead; pig-iron quotations have been marked up in four of the chief buying centers, namely, Cincinnati, Birmingham, Philadelphia, and Chicago. Abrasives offer the outstanding exception to the present market, in that prices in these have tended downward for the last three weeks. Steel demand is more active in plates, pipe and automotive material than in some of the other lines. Mill operations continue at 80@85 per cent of capacity in the Pittsburgh district.

*(All prices as of Sept. 7, 1928)*

## IRON AND STEEL

**PIG IRON**—Per gross ton, f.o.b.:

| | |
|---|---|
| CINCINNATI | |
| No. 2 Southern | $20.19 |
| Northern Basic | 20.89 |
| Southern Ohio No. 2 | 21.19 |
| NEW YORK—Tidewater Delivery | |
| Southern No. 2 (silicon 2.25@2.75) | 25.12 |
| BIRMINGHAM | |
| No. 2 Foundry | 16.50 |
| PHILADELPHIA | |
| Eastern Pa., No. 2x (silicon 2.25@2.75) | 20.76 |
| Virginia No. 2 | 27.17 |
| Basic | 20.76 |
| CHICAGO | |
| No. 2 Foundry local (silicon 1.75@2.25) | 20.00 |
| No. 2 Foundry, Southern (silicon 2.25@2.75) | 22.51 |
| PITTSBURGH, including freight charge ($1.76) from Valley: | |
| No. 2 Foundry | 19.26 |
| Basic | 19.26 |
| Bessemer | 21.26 |

**IRON MACHINERY CASTINGS**—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

| | |
|---|---|
| Detroit | 4.50 |
| Cleveland | 5.00 |
| Cincinnati | 4.30 |
| New York | 5.25 |
| Chicago | 4.50@4.75 |

**SHEETS**—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

| Blue Annealed | Pittsburgh Mill Base | Chicago | Cleveland | New York |
|---|---|---|---|---|
| No. 10 | 2.10@2.20 | 3.35 | 3.25 | 3.90* |
| No. 12 | 2.15@2.25 | 3.40 | 3.30 | 3.95* |
| No. 14 | 2.25@2.35 | 3.45 | 3.35 | 4.00* |
| No. 16 | 2.35@2.45 | 3.55 | 3.45 | 4.10* |
| Black | | | | |
| Nos. 18 to 20 | 2.40@2.45 | 3.60 | 3.20 | 4.00 |
| No. 22 | 2.55@2.60 | 3.75 | 3.35 | 4.15 |
| No. 24 | 2.60@2.65 | 3.80 | 3.40 | 4.20 |
| No. 26 | 2.70@2.75 | 3.90 | 3.50 | 4.30 |
| No. 28 | 2.85@2.90 | 4.05 | 3.65 | 4.45 |
| Galvanized | | | | |
| No. 10 | 2.70@2.90 | 3.95 | 3.55 | 4.25 |
| Nos. 12 to 14 | 2.80@3.00 | 4.05 | 3.65 | 4.35 |
| No. 16 | 2.90@3.10 | 4.15 | 3.75 | 4.45 |
| No. 18 | 3.05@3.25 | 4.30 | 3.90 | 4.60 |
| No. 20 | 3.20@3.40 | 4.45 | 4.10 | 4.75 |
| No. 22 | 3.25@3.45 | 4.50 | 4.15 | 4.80 |
| No. 24 | 3.40@3.60 | 4.65 | 4.25 | 4.95 |
| No. 26 | 3.65@3.85 | 4.90 | 4.50 | 5.20 |
| No. 28 | 3.90@4.10 | 5.15 | 4.75 | 5.45 |

*250 to 3,999 lb.

**WELDED STEEL PIPE**—Warehouse discounts are as follows:

| | New York | | Cleveland | | Chicago | |
|---|---|---|---|---|---|---|
| | Black | Galv. | Black | Galv. | Black | Galv. |
| 1 to 3 in., butt welded | 50% | 36% | 55½% | 43½% | 54% | 41% |
| 2½ to 6 in., lap welded | 45% | 32% | 53½% | 40½% | 51% | 38% |

WROUGHT-STEEL PIPE LIST

| Size, Inches | List Price per Foot | —Diameter in Inches— External | Internal | Thickness Inches |
|---|---|---|---|---|
| 1 | $0.17 | 1.315 | 1.049 | .133 |
| 1¼ | .23 | 1.66 | 1.38 | .14 |
| 1½ | .27½ | 1.9 | 1.61 | .145 |
| 2 | .37 | 2.375 | 2.067 | .154 |
| 2½ | .58½ | 2.875 | 2.469 | .203 |
| 3 | .76½ | 3.5 | 3.068 | .216 |
| 3½ | .92 | 4.0 | 3.548 | .226 |
| 4 | 1.09 | 4.5 | 4.026 | .237 |
| 4½ | 1.27 | 5.0 | 4.506 | .247 |
| 5 | 1.48 | 5.563 | 5.047 | .258 |
| 6 | 1.92 | 6.625 | 6.065 | .28 |

**SEAMLESS STEEL TUBING**—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

| —Thickness— Decimal | B.w.g. and Fractions | Outside Diameter in Inches ½ | ⅝ | ¾ | ⅞ | 1 | 1¼ | 1½ |
|---|---|---|---|---|---|---|---|---|
| | | Price per Foot | | | | | | |
| .035" | 20 | $0.15 | $0.16 | $0.17 | $0.18 | $0.19 | $0.21 | $0.23 |
| .049" | 18 | .17 | .18 | .19 | .20 | .21 | .23 | .25 |
| .065" | 16 | .19 | .20 | .21 | .22 | .23 | .25 | .27 |
| .083" | 14 | .20 | .22 | .23 | .24 | .25 | .27 | .29 |
| .095" | 13 | .21 | .23 | .25 | .26 | .27 | .29 | .31 |
| .109" | 12 | .22 | .24 | .26 | .27 | .28 | .30 | .32 |
| .120" or .125" | 11 | .23 | .25 | .27 | .28 | .29 | .31 | .33 |
| .134" | 10 | .24 | .26 | .28 | .29 | .30 | .32 | .34 |

**MISCELLANEOUS**—Warehouse base prices in cents per lb.:

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Spring steel, light* | 4.50 | 4.65 | 4.65 |
| Spring steel, heavier | 4.00 | 4.00 | 4.00 |
| Coppered Bessemer rods | 6.05 | 6.00 | 6.20 |
| Hoop steel | 4.50‡ | 4.00 | 4.15 |
| Cold rolled strip steel | 6.25 | 6.00 | 6.10 |
| Floor plates | 5.10‡ | 5.30 | 5.00 |
| Cold drawn, round or hexagon† | 3.40 | 3.65 | 3.60 |
| Cold drawn, flat or square† | 3.90 | 4.15 | 4.10 |
| Structural shapes | 3.30‡ | 3.00 | 3.10 |
| Soft steel bars | 3.25‡ | 3.00 | 3.00 |
| Soft steel bar shapes | 3.25‡ | 3.00 | 3.00 |
| Soft steel bands | 4.00‡ | 3.65 | 3.65 |
| Tank plates | 3.30‡ | 3.00 | 3.10 |
| Bar iron (2.75 at mill) | 3.24 | 3.00 | 3.00 |
| Drill rod (from list) | 60% | 55% | 50% |

*Flat, $\frac{3}{16}$@½-in. thick. †Cold finished steel, shafting and screw stock. ‡250 to 3,999 lb., ordered and released for shipment at one time.

Electric welding wire, New York, $\frac{3}{32}$, 8.35c.; $\frac{1}{8}$, 7.85c.; $\frac{5}{32}$ to $\frac{1}{4}$ 7.35c. per lb.

## METALS

Warehouse Prices in Cents Per Pound for Small Lots:

| | | | |
|---|---|---|---|
| Copper, electrolytic, New York | | | 16.00 |
| Tin, Straits, pigs, New York | | | 49.00 |
| Lead, pigs, E. St. Louis | 6.25 | New York | 7.00 |
| Zinc, slabs, E. St. Louis | 6.25 | New York | 7.12½ |

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Antimony, slabs | 13.00 | 13.00 | 14.25 |
| Copper sheets, base | 23.50 | 23.50 | 23.50 |
| Copper wire, base | 20.12½ | 19.62½ | 16.75* |
| Copper bars, base | 22.00 | 22.00 | 22.50 |
| Copper tubing, base | 25.00 | 25.00 | 25.00 |
| Brass sheets, high, base | 19.25 | 19.25 | 19.25 |
| Brass tubing, high, base | 24.12½ | 24.12½ | 24.12½ |
| Brass rods, high, base | 17.00 | 17.00 | 17.00 |
| Brass wire, high, base | 19.75 | 19.75 | 19.75 |

*At mill

# Shop Materials and Supplies

## METALS—Continued

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Aluminum ingots, 99% | 25.00* | 24.30 | 24.30 |
| Zinc sheets (casks) | 10.00@10.50 | 11.00 | 9.61 |
| Solder (strictly) | 32.25 | 30.75 | 31@34 |
| Babbitt metal, delivered in case lots, New York, cents per lb.: | | | |
| Genuine, highest grade | | | 68.00 |
| Commercial genuine, intermediate grade | | | 53.00 |
| Anti-friction metal, general service | | | 31.50 |
| No. 4 babbitt (f.o.b.) | | | 12.25 |
| Nickel, f.o.b. refinery, Bayonne, N. J., cents per lb.: | | | |
| Ingots 35.00 | Electrolytic 37.00 | Shot 36.00 | |

*Delivered.

**SPECIAL NICKEL AND ALLOYS**—Price in cents per lb., f.o.b. Huntington, W. Va.:

| | |
|---|---|
| Full finished nickel sheet (base) | 52.00 |
| Cold rolled nickel sheet (base) | 60.00 |
| Hot rolled rods, Grade "A" (base) | 45.00 |
| Cold drawn rods, Grade "A" (base) | 53.00 |

Base price of Monel metal in cents per lb., f.o.b. Huntington, W. Va.:

| | | | |
|---|---|---|---|
| Shot | 28.00 | Hot rolled rods (base) | 35.00 |
| Blocks | 28.00 | Cold drawn rods (base) | 43.00 |
| Cold rolled sheets (base) | 50.00 | Full finished sheets (base) | 42.00 |

**OLD METALS**—Dealers' purchasing prices in cents per pound, f. o. b. cars, depending on quantity:

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Crucible copper | 12.75 @13.00 | 12.00 | 11.75@12.25 |
| Copper, heavy, and wire | 12.00 @12.75 | 11.25 | 11.25@11.75 |
| Copper, light, and bottoms | 10.87½@11.12½ | 9.75 | 10.00@10.50 |
| Heavy lead | 5.12½@ 5.37½ | 5.25 | 4.75@ 5.25 |
| Tea lead | 3.62½@ 3.87½ | 3.75 | 3.75@ 4.25 |
| Brass, heavy, yellow | 7.25 @ 7.50 | 7.75 | 7.25@ 7.75 |
| Brass, heavy, red | 10.00 @10.37½ | 10.00 | 9.50@ 9.75 |
| Brass, light | 5.87½@ 6.12½ | 16.25 | 6.25@ 6.75 |
| No. 1 yellow rod turnings | 8.00 @ 8.50 | 7.75 | 7.75@ 8.25 |
| Zinc | 3.25 @ 3.50 | 3.25 | 2.87½@3.37½ |

**TIN PLATES**—Charcoal—Bright—Per box.

| | | New York | Cleveland | Chicago |
|---|---|---|---|---|
| "AAA" Grade: | | | | |
| IC, | 14x20 | $12.10 | $11.95 | $11.50 |
| "A" Grade: | | | | |
| IC, | 14x20 | 9.70 | 9.90 | 9.50 |
| | Coke Plates—Primes—Per box | | | |
| 100-lb., | 14x20 | 6.45 | 6.10 | 7.00 |
| | Terne Plates—8-lb. Coating—Small lots—Per box | | | |
| IC, | 14x20 | 7.75@8.00 | 7.00 | 7.50 |

## MISCELLANEOUS

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Cotton waste, white, per lb.* | $0.10@0.13½ | $0.16 | $0.15 |
| Cotton waste, colored, per lb.* | .09@ .13 | .12 | .12 |
| Wiping cloths, washed white, per lb | .15½ | 38.00 per M | .17 |
| Sal soda, per lb | .02 | .02 | .02 |
| Roll sulphur, per lb | .027 | .03½ | .04 |
| Linseed oil, raw, in 1 to 4 bbl. lots, per lb | .105 | .105 | .103 |
| Cutting oil, about 25% lard, in 5 gal. cans, per gal | .65 | .60 | .60 |
| Machine oil, medium-bodied (55 gal. steel bbl.) per gal | .30 | .36 | .36 |
| Belting—Present discounts from list in fair quantities (½ doz. rolls). | | | |
| Leather—List price, 24c. per lin.ft. per inch of width for single ply.: | | | |
| Medium grade | 30–10% | 30–10% | 35% |
| Heavy grade | 25–5% | 30–5% | 30% |
| Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.: | | | |
| First grade | 50% | 50–10% | 50% |
| Second grade | 60% | 60–5% | 50–10% |

*All waste in bale lots.

## *Comparative Warehouse Prices*

| New York | Unit | Current Price | Four Weeks Ago | One Year Ago |
|---|---|---|---|---|
| Soft steel bars | per lb | $0.0325 | $0.0325 | $0.0324 |
| Cold drawn shafting | per lb | .034 | .034 | .04 |
| Brass rods | per lb | .17 | .17 | .16 |
| Solder (½ and ½) | per lb | .3225 | .3225 | .39 |
| Cotton waste, white | per lb | .10@.13½ | .10@.13½ | .10@.13½ |
| Emery disks, cloth, No. 1, 6-in. dia | per 100 | 3.05 | 3.10 | 3.10 |
| Lard cutting oil | per gal | .65 | .65 | .65 |
| Machine oil | per gal | .30 | .30 | .27 |
| Belting, leather, medium | off list | 30–10% | 30–10% | 40–5% |
| Machine bolts, up to 1x30 in., full kegs | off list | 50%* | 50%* | 50%* |

*List prices as of April 1, 1927.

## MISCELLANEOUS—Continued

| | New York | Cleveland | Chicago |
|---|---|---|---|
| Abrasive materials—Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets: | | | |
| *Flint paper | $4.29 | $4.29 | $4.29 |
| *Emery paper | 10.71 | 10.71 | 10.71 |
| †Emery cloth | 20.97 | 20.97 | 20.97 |
| Emery disks, 6 in. dia., No. 1, per 100: | | | |
| Paper | 1.32 | 1.32 | 1.32 |
| Cloth | 3.05 | 3.05 | 3.05 |
| Fire clay, per 100 lb. bag | 1.00 | .75 | .75 |
| Coke, prompt furnace, per net ton | Connellsville, | | 2.75@3.00 |
| Coke, prompt foundry, per net ton | Connellsville, | | 4.00@4.50 |
| White lead, dry or in oil | 100 lb. kegs | New York, | 13.25 |
| Red lead, dry | 100 lb. kegs | New York, | 13.25 |
| Red lead, in oil | 100 lb. kegs | New York, | 14.75 |

*4½ reams and under. †Less than 2 reams.

## SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

| | Full Kegs or Cases |
|---|---|
| Machine bolts, square heads and nuts: | |
| Up to ¾ x 6-in. | 55% |
| Larger up to 1 x 30-in. | 50% |
| 1¼ and 1½ in. dia. | 35% |
| Carriage bolts: | |
| Up to ½ x 6-in. | 55% |
| Larger sizes | 50% |
| Coach and lag screws: | |
| Up to ½ x 6-in. | 55% |
| Larger sizes | 50% |
| Tap bolts, hexagonal heads | 40% |
| Nuts: | |
| Hot pressed, square and hexagonal, blank or tapped, up to 1-in., incl. | 55% |
| Cold punched, square and hexagonal, blank or tapped, up to 1-in. incl | 55% |
| Semi-finished, hexagonal, tapped, in packages, all sizes | 40% |
| Case hardened, hexagonal, tapped, in packages, all sizes | 30% |
| Washers: Deduct from list, per 100 lb | $3.50* |
| Rivets, button and cone head: | |
| Small, including $\frac{7}{16}$-in. dia | 50–10% |
| Large (base) per 100 lb. net | $5.00† |

Note—For less than full package quantities on bolts, screws, hot-pressed and cold-punched nuts, add extra of 10 per cent to list.
*Broken keg lots, $1.50 off list. †Broken keg lots, $6.50 net.

# Machine Requirements and Industrial Construction

## Equipment Wanted

**Calif., San Diego**—Bureau of Yards & Docks, Navy Dept., Washington, D. C.—will receive bids until Oct. 3rd for an electric bridge crane for Naval Operating Base here.

**Mich., Detroit**—Long Mfg. Co., 2768 East Grand Blvd.—general equipment for assembly of cooling systems and clutches, plant expansion. Estimated cost $50,000.

**Mich., Flint**—Chevrolet Motor Car Co., General Motors Bldg., Detroit—conveying equipment for proposed 2 story, 200 x 240 ft. auto assembly plant on Kearsley St., here.

**Mo., St. Louis** — Missouri Pacific R.R., 13th and Olive Sts., W. M. Hopkins, Gen. Purch. Agt.—4 ft. radial drill, nipple machine, portable boring bar, small floor grinder and several smaller machines.

**N. Y., Richmond Hill** (Br. Jamaica)—Bd. of Education, W. C. Martin, Supt. of School Bldgs., Flatbush Ave. Est. and Concord St., Brooklyn—will received bids until Sept. 19 for machinery and tool equipment, printing room equipment, etc. for Richmond Hill high school, 114th and 113th Sts. and 89th Ave. here.

**O., Columbus**—Adams Bros. Co., 338 South High St., W. H. Adams, Gen. Mgr. (bench grinders, etc.)—lathe, milling machine, grinder and other equipment for shop.

**O., Columbus**—Hornbeck Motor Co., 967 North High St., D. C. Hornbeck, Gen. Mgr., valve grinder, and air compressor for shop.

**Okla., Sand Springs**—Tulsa Rolling Steel Mill, c/o J. H. McAlarney, 215 Mid Continent Bldg., Tulsa—steel rolling mill equipment for proposed 1 story, 135 x 432 ft. mill here. Estimated cost $200,000.

**Okla., Seminole**—R. H. Chase & Co.—¾ yd. power crane for paving work.

**Tex., San Antonio**—Milam Chevrolet Co., 1435 Main Ave.—machinery and equipment for general automotive repairing for proposed 2 story, 100 x 150 ft. garage and sales building.

**Ont., Blenheim**—G. W. Mallory—automatic screw machine.

**Ont., Durham**—Smith Bros.—prices and catalogs on complete equipment for auto repair shop, vulcanizing plant and garage recently destroyed by fire to cost $35,000.

**Ont., Hamilton**—A. Jobborn, 56 Guise St.—16 in. engine lathe with taper attachment, drill grinder and disc grinder; milling machines; cylindrical and surface grinders; four spindle drill press; centering machine, etc.

## Opportunities for Future Business

**Calif., Colton**—J. H. Miller, California Hotel Bldg., San Bernardino, is having plans prepared for the construction of a factory on Eighth St., Eldridge & Renfro, California Hotel Bldg., San Bernardino, Archts. Colton Building Material & Supply Co. and Colton Furniture Co., Colton, lessees.

**Calif., San Leandro**—Chrysler Co., Highland ark, Mich., plans the construction of an assembly plant at Durant Ave. and East 14th St. here. Estimated cost $1,000,000.

**Conn., Berlin** — Goss & Deleeuw Machine Co. awarded contract for a 1 story, 100 x 175 ft. addition to plant.

**Conn., Bristol**—E. Ingraham Co., 392 North Main St., awarded contract for a 5 story, 50 x 162 ft. factory on North Main St. Estimated cost $100,000. Noted Aug. 23.

**Conn., Bristol**—New Departure Mfg. Co., 269 North Main St., had plans prepared for a 1 story, 125 x 200 ft. factory on Terryville Ave. Estimated cost $75,000. Private plans.

**Conn., Thomaston**—Seth Thomas Clock Co., Elm St., plans the construction of several units to plant on South Main St. Estimated cost to exceed $40,000.

**Ill., Chicago** — Reflector & Hardware Specialty Mfg. Co., 2253 South Western Ave., awarded contract for addition to factory at 2253 South Western Ave. Estimated cost $15,000. Noted Mar. 1.

**Ill., Chicago** — Ritz — Chicago Garage Corp., 134 North La Salle St., awarded contract for a 3 story, 46 x 167 ft. garage at 5017-21 Lake Park Ave. Estimated cost $400,000.

**Ill., Chicago**—Wilson Steel Products Co., 4850 South Western Ave., manufacturers of wire baskets, etc., awarded contract for a 1 story, 93 x 100 ft. factory at 4850 South Western Ave. Estimated cost $15,000. Noted Aug. 16.

**Ind., Indianapolis**—Diamond Chain Co., Kentucky Ave. and South St., awarded contract for a 1 and 4 story, 40 x 100 and 60 x 160 ft. factory. Estimated cost $100,000.

**Ind., Indianapolis**—E. E. Sims, 605 State Life Bldg., is receiving bids for a 1 story, 60 x 195 ft. machine shop and garage at 1617 East Washington St. Estimated cost $47,000. McGuire & Shook, North Meridian St., Archts.

**Ind., South Bend**—Dodge Mfg. Co. manufacturers of oil engines, awarded steel contract for a 1 story, 99 x 200 ft. factory on South Union St. Estimated cost $46,000.

**Ind., South Bend** — Studebaker Corp., awarded contract for a 1 story, 140 x 175 ft. factory. Estimated cost $52,000.

**Ia., Dubuque** — International Harvester Co. of America, 606 South Michigan Ave., Chicago, Ill., awarded contract for a 1 story, 93 x 172 ft. service building, here. Estimated cost $50,000.

**Ky., Louisville**—Mengel Body Co., Fourth and G Sts., awarded contract for a 2 story, 306 x 441 ft. factory for the manufacture of automobile bodies. Estimated cost $1,000,000.

**Mass., Boston**—Packard Motor Car Co., A. MacAuley, Pres., Grand Blvd., Detroit, Mich., is having revised plans prepared for a 4 story, 115 x 235 ft. garage and sales and service station on Commonwealth Ave. here. A. Kahn, Inc., Marquette Bldg., Detroit, Mich., Archt. Noted July 19.

**Mass., Dorchester** (Boston P. O.) — Joseph Pollack Tool Mfg. Co., 61 Freeport St., is receiving bids for a 1 story addition to factory on Freeport St. Miller & Levi, 46 Cornhill, Boston, Archts.

**Mass., New Bedford**—Continental Wood Screw Co., P. Sweeney, Mt. Pleasant St., had plans prepared for a 2 story, 60 x 100 ft. addition to factory. Estimated cost $50,000. Leary & Walker, Union St., Archts.

**Mass., Springfield**—J. C. Robinson, 1387 Main St., awarded contract for a 1 story, 80 x 200 ft. repair and service garage on Memo Ave. Estimated cost $40,000.

**Mich., Flint**—Chevrolet Motor Co., General Motors Bldg., Detroit, awarded contract for a 1 story, 205 x 315 ft. auto machine shop plant on West Kearsley St., here.

**Mich., Highland Park** (Detroit P. O.)—Chrysler Motor Car Co. is having plans prepared for a 1 story, 45 x 400 ft. addition to automobile plant for engineering and experimental departments on Oakland Ave. Estimated cost $55,000. Smith, Hinchman & Grylls, 800 Marquette Bldg., Detroit, Archts.

**Mich., Lansing** — Olds Motor Works, 1101 Division St., plans the construction of a 2 story, 130 x 460 ft. addition to auto assembly plant. Estimated cost $350,000. The Austin Co., General Motors Bldg., Detroit, Archt. and Engr.

**Minn., St. Paul**—Holt Motor Co., 1301 Henn St., awarded contract for a 1 story, 120 x 150 ft. garage at 5th and Franklin Sts. Estimated cost $50,000.

**Mo., St. Louis**—N. O. Nelson Mfg. Co., 928 Chestnut St., manufacturers of plumbing supplies, etc., will soon receive bids for a 2 story factory and warehouse, etc., at Duncan and Boyle Aves. Estimated cost $300,000. P. J. Bradshaw, 718 Locust St., Archt.

**N. J., Elizabeth**—Hitchings & Co., 701 Spring St., (greenhouse builders), awarded contract for remodeling 2 story, 70 x 200 ft. mill. Estimated cost $150,000. Noted Aug. 23.

**N. J., West New York**—Public Service Electric & Gas Co., 80 Park Pl., Newark, will build a 2 story, 60 x 200 ft. repair shop and warehouse at 12th and Jefferson Sts. Estimated cost $200,000. Public Service Production Co., 80 Park Pl., Newark, Archt. Noted May 31.

**N. Y., Brooklyn**—Marion Reid Garage & Gas Station Inc., L. Rosenberg, Pres., 391 Fulton St., plans the construction of a 2 story, 100 x 159 ft. garage at Atlantic Ave. Estimated cost $100,000. Kleirnert & Klie, 250 Park Ave., New York, Archt.

**N. Y., Oswego**—Fitzgibbons Boiler Co., H. Adams, Pres., plans addition to plant for the manufacture of heating boilers to double capacity of plant. R. W. M. Kent, Philadelphia, Pa., Engr.

**Okla., Dewey**—National Zinc Co. is having preliminary plans prepared for the construction of a zinc smelter. Estimated cost $60,000. Private plans.

**Pa., Philadelphia**—Philadelphia Coke Co., 4501 Richmond St., awarded contract for the construction of a 1 story, 42 x 93 ft. machine shop.

**Tex., Smithville**—Missouri-Kansas-Texas R.R. Co., St. Louis, Mo., will soon award contract for improvements to locomotive terminal facilities including roundhouse, machine shop, etc., here. Estimated cost $200,000.

**Wis., Beaver Dam**—The Malleable Iron Range Co., awarded contract for a 86 x 110 ft. addition to factory and warehouse, etc.

**Ont., Peterborough**—Canadian General Electric Co., Park St., plans the construction of a 1 story, 110 x 328 ft. punch press building on Park St. Estimated cost $100,000. Private plans.

**Ont., Toronto**—Dominion Bridge Co. Ltd., Reford Bldg., awarded general contract for a 1 story addition to steel plant on Sorauren Ave. Estimated cost $150,000. Noted Feb. 2.

**Ont., Toronto**—Gudle Motor Mfg. Co., 105 Sherbourne St., awarded contract for a 1 story, 70 x 70 ft. plant.

**Ont., Toronto** — Service Station Equipment Co., 510 King St. E., awarded contracts for excavation, concrete and roofing for a 1 story, 100 x 400 ft. factory on Coxwell Ave. Estimated cost $200,000. Noted Aug. 2.

**Ont., Toronto** — Willys-Overland Ltd, Weston Rd., plans the construction of a 4 story, 60 x 260 ft. addition to auto plant on Weston Rd. Estimated cost $150,000. M. J. Steyffert, c/o owners, Engrs.

**Ont., Windsor**—Chrysler Motor Corp. of Canada, J. D. Mansfield, Pres., plans the construction of a factory.